2010
LOUISIANA WATER QUALITY INVENTORY: INTEGRATED REPORT

FULFILLING REQUIREMENTS OF THE FEDERAL CLEAN WATER ACT, SECTIONS 305(b) AND 303(d)

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The 2010 Integrated Report was edited by Albert E. Hindrichs, under the direction of Stephanie Braden, Environmental Manager, Water Quality Section; Melvin C. Mitchell, Administrator, Water Permits Division (WPD), and Cheryl Sonnier Nolan, Assistant Secretary, Office of Environmental Services. Contributing authors include: Jan Boydstun, Kimberly Corts, Ross Hartfield, Suzanne Rohli, Kristine Pintado, and Alicia Walsh. John Jennings of the LDEQ Business and Community Outreach and Incentives Division, Nonpoint Source Pollution Control and Aquifer Evaluation and Protection Section wrote the section on ground water quality. Additional editorial review was provided by Nicole Anthony, Cindy Morrison, and David Burton.

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PART I: EXECUTIVE SUMMARY/OVERVIEW

Summary of Louisiana's Water Quality Assessment Program

Louisiana, well known for its abundance of water resources, contains over 66,294 miles of rivers and streams, 1,078,031 acres (1,684 square miles) of lakes and reservoirs, 5,550,951 acres (8,673 square miles) of fresh and tidal wetlands, and 4,899,840 acres (7,656 square miles) of estuaries. These figures, some of which are taken from the U.S. Environmental Protection Agency's (USEPA) River Reach 3 file, are believed to be low in comparison to the actual total area of Louisiana's rivers, lakes, wetlands, and estuaries. It is the responsibility of the Louisiana Department of Environmental Quality (LDEQ) to protect the chemical, physical, biological, and aesthetic integrity of the water resources and aquatic environment of Louisiana. This responsibility is undertaken through the use of public education, scientific endeavors, water quality management, and regulatory enforcement in order to provide the citizens of Louisiana with clean and healthy water now and in the future.

The 2010 Integrated Report documents LDEQ's progress toward meeting this responsibility. Louisiana's Integrated Report is produced, in part, to meet requirements of the Federal Water Pollution Control Act commonly known as the Clean Water Act (CWA) (CWA 1972). The primary CWA sections addressed by the 2010 Integrated Report are §303(d) and §305(b). Section 303(d) requires states to list impaired water bodies and to develop a Total Maximum Daily Load (TMDL) for those water bodies. Section 305(b) of the CWA requires each state to provide the following information to the Administrator of the USEPA:

- A description of the water quality of all navigable waters in the state;
- An assessment of the status of waters of the state with regard to their support of recreational activities and fish and wildlife propagation;
- An assessment of the state's water pollution control activities toward achieving the CWA goal of having water bodies that support recreational activities and fish and wildlife propagation;
- An estimate of the costs and benefits of implementing the CWA; and
- A description of the nature and extent of nonpoint sources of pollution and recommendations for programs to address nonpoint source pollution.

For the *2010 Integrated Report*, LDEQ used USEPA's *Consolidated Assessment and Listing Methodology* (USEPA 2002), which contains the Integrated Report (IR) guidance, as well USEPA's guidance document, *Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act* (USEPA 2005). In addition to the previous two documents, USEPA issues updates to the Integrated Report guidance in the form of memoranda prior to each Integrated Reporting period (USEPA 2006). Louisiana's water quality regulations (Environmental Regulatory Code (ERC) 33:IX.1101 et seq. (ERC 2010)) were used to determine water quality uses and criteria and, in some cases, assessment procedures. One of the primary focuses of USEPA's IR guidance is on the use of eight categories to which water bodies or water body/impairment combinations may be assigned. Categorization under IR guidance allows for a more focused approach to water quality management by clearly determining which actions are required to protect or improve individual waters of the state. The eight IR categories used by LDEQ can be found in table 1.1.1.

Table 1.1.1.

U.S. Environmental Protection Agency Integrated Report Methodology guidance categories used to categorize water body/pollutant combinations for the *Louisiana 2010 Integrated Report*

IR Category (IRC)	IR Category Description
IRC 1	Specific Water body Impairment Combination (WIC) cited on a *previous* §303(d) list is now attaining all uses and standards. Also used for water bodies that are fully supporting all designated uses.
IRC 2	Water body is meeting some uses and standards but there is insufficient data to determine if uses and standards associated with the specific WIC cited are being attained.

Table 1.1.1.

U.S. Environmental Protection Agency Integrated Report Methodology guidance categories used to categorize water body/pollutant combinations for the *Louisiana 2010 Integrated Report*

IR Category (IRC)	IR Category Description
IRC 3	There is insufficient data to determine if uses and standards *associated with the specific WIC* cited are being attained.
IRC 4a	WIC exists but a TMDL has been completed for the *specific WIC* cited.
IRC 4b	WIC exists but control measures other than a TMDL are expected to result in attainment of designated uses *associated with the specific WIC* cited.
IRC 4c	WIC exists but a pollutant (anthropogenic source) does not cause the *specific WIC* cited.
IRC 5	WIC exists for one or more uses, and a TMDL is required for the *specific W*IC cited. **IRC 5 and its subcategories represents Louisiana's §303(d) list.**
IRC 5RC (Revise Criteria)	WIC exists for one or more uses, and a TMDL is required for the specific WIC cited; however, LDEQ will investigate revising criteria due to the possibility that natural conditions may be the source of the water quality criteria impairments.

Gulf of Mexico Deepwater Horizon Oil Spill Response

On April 20, 2010, British Petroleum (BP), p.l.c. experienced a well blowout in Mississippi Canyon Block 252 located approximately 50 miles off the coast of Louisiana, in waters of the United States. This blowout resulted in continuous discharges of oil and natural gas from the wellhead into waters of the United States. The continuous discharges of oil and other pollutants have impacted the waters and coastline of the state of Louisiana and elsewhere along the Gulf Coast. The 2010 IR, while hereby acknowledging the significant impact of this oil spill on Louisiana coastal waters, does not attempt to formally assess the impact at this time. This IR is intended to address water quality conditions from 1 January 2006 through 30 September 2009; therefore, the impacts of the spill fall outside the period covered by this report. For more information regarding the BP oil spill refer to the LDEQ web site at: http://www.deq.louisiana.gov/portal/tabid/3052/Default.aspx. Following completion of LDEQ's oil spill response this web site may be discontinued or modified.

Summary of Overall Water Quality in Louisiana

For the fifth consecutive IR reporting cycle, Louisiana's water quality has shown incremental improvements starting with a baseline of the 2000 IR (figure 1.1.1). Most notably, the designated use of fish and wildlife propagation (FWP or "fishing") showed improvement for 2010 after experiencing a small reduction in the number of subsegments fully supporting this use in 2008. The 2008 reduction was due largely to a change in water quality assessment procedures. The change in procedure was continued for the 2010 report, making this slight improvement all the more encouraging.

The primary contact recreation (PCR or "swimming") use continued to show improvement this year with 83.8% of water bodies with this designated use now fully supporting it. Likewise, secondary contact recreation (SCR or "boating") improved to 97.2% of water bodies so designated fully supporting this use. As with many environmental issues, it becomes increasingly difficult to show continuing improvement as conditions get closer and closer to 100% success. This is not due to reduced effort but rather results from easier solutions having been obtained, thus leaving the most intractable problems to be overcome. LDEQ, with the cooperation of federal, state, local, and private entities, will continue to work toward bringing all water bodies into full support of these designated uses.

In 2004, then Governor Kathleen Babineaux Blanco set a goal of reducing the number of water body subsegments impaired for the two designated uses of swimming and fishing by 25% by the year 2012. With regard to the swimming use, Governor Blanco called for 28 of 111 water bodies then impaired for swimming to be improved to the point of full support. Louisiana has met this goal two years ahead of schedule. Based on the 2010 IR, 40 additional water bodies, or 35.7% of the 111 baseline swimming impairments, are now fully supporting this use.

While the exact cause of these improvements frequently cannot be determined with certainty, a number of activities across the state are contributing to improvements. For example, best management practices (BMP) for nonpoint source pollution control continue to be developed and implemented in many rural, suburban, and urban settings. Likewise, improvement and use of BMPs in farming and forestry practices continue throughout the state. New and improved sewage treatment plants are developed on a regular basis, leading to both a reduction in sewage loading and improvements in dissolved oxygen concentrations. State and local agencies continue to work toward better enforcement of home sewage system ordinances and regulations. And as the recently developed watershed initiatives progress around the state, more unpermitted or otherwise noncompliant dischargers are identified and brought into compliance.

Fish and Wildlife Propagation (FWP) continues to be a difficult designated use for which to show overall improvement. As noted in previous IRs, this is due in part to the fact there are many different water quality parameters used to assess this use. LDEQ currently looks at dissolved oxygen (often of primary concern in Louisiana), pH, chlorides, sulfates, total dissolved solids, turbidity, seven different metals, and dozens of organic compounds when assessing water quality for this designated use. In addition to these monitored parameters, the possible presence of fish consumption advisories due to mercury or organic chemicals also frequently results in impairment to this designated use. Table 1.1.2 provides a list of the suspected causes of impairment to FWP along with a count of the water body subsegments for each water body type affected by the suspected impairment.

As illustrated in the preceding paragraph, the corresponding Governor's goal for FWP established in 2004 has proved much more difficult to reach. The 2012 goal called for 77 of 310 water bodies impaired for FWP to be improved to full support for this use. Currently, 8 additional water bodies, or 2.6% of the baseline impairment number, have been found to be fully supporting their FWP use.

Figure 1.1.1
Comparison of the percentage of water body subsegments in Louisiana fully supporting the three primary designated uses. *2010 Louisiana Integrated Report* assessment.

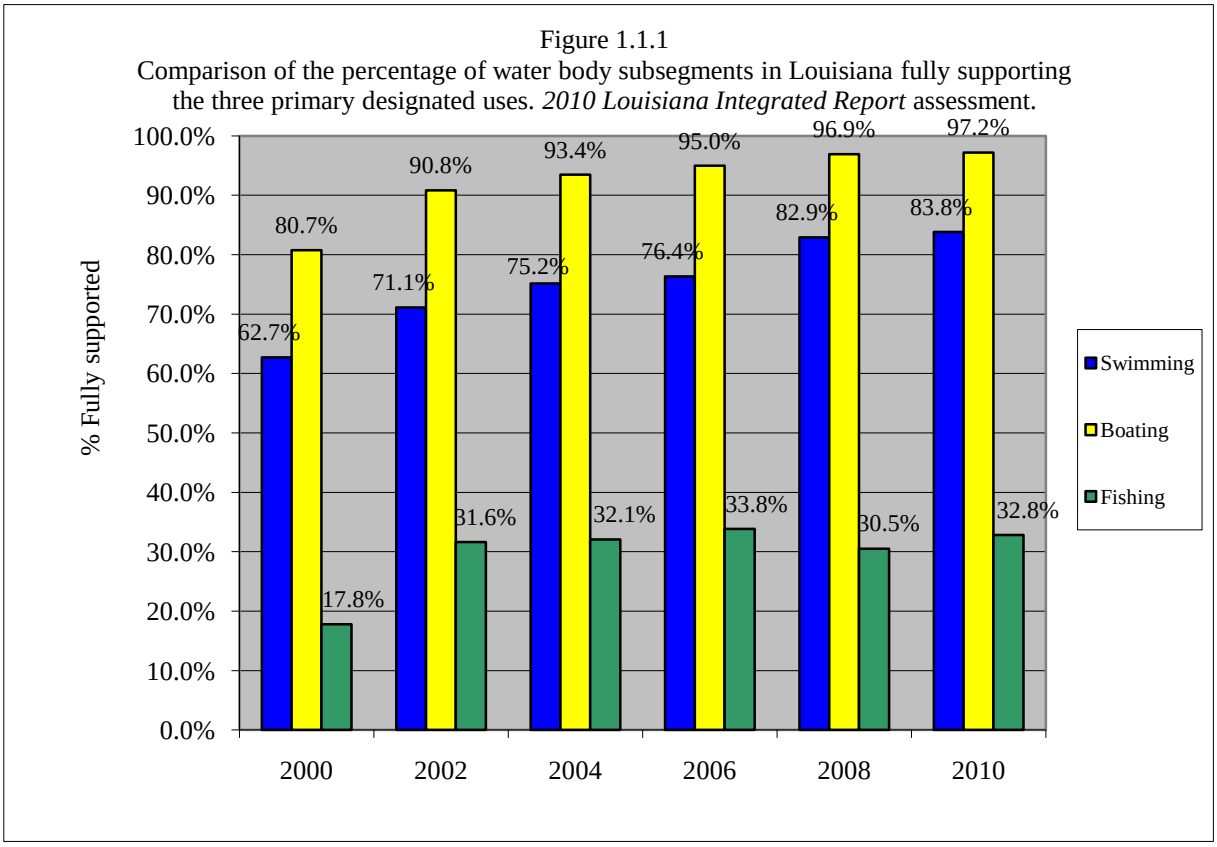


Table 1.1.2.

Number of water body subsegments, with the designated use of fish and wildlife propagation, impacted by each suspected cause of impairment. *2010 Louisiana Integrated Report* assessment.

Suspected Causes of Impairment	River	Lake	Estuary	Wetland	Total
Oxygen, Dissolved	155	26	6	3	190
Mercury in Fish Tissue	73	20	9	1	103
Turbidity	53	18	4		75
Total Dissolved Solids	61	4		1	66
Nitrate/Nitrite (Nitrite + Nitrate as N)	48	7	2		57
Phosphorus (Total)	46	7	2		55
Total Suspended Solids (TSS)	40	6	1		47
Non-Native Aquatic Plants	26	16	1		43
Sulfates	36	5		1	42
Chloride	31	1		1	33
Sedimentation/Siltation	28	4	1		33
Carbofuran	22	1	1		24
Lead	16	1	1		18
pH, Low	14	3			17
DDT	6				6
Fipronil	6				6
pH, High	2	4			6
Polychlorinated Biphenyls	3	3			6
Hexachlorobenzene	1	1			2
Hexachlorobutadiene	1	1			2
Oil and Grease	1	1			2
Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)	2				2
Toxaphene	2				2
1,1,1,2-Tetrachloroethane	1				1
1,2-Dichloroethane	1				1
Arsenic		1			1
Atrazine	1				1
Bromoform	1				1
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	1				1
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) (only)	1				1
Methoxychlor	1				1
Methyl Parathion	1				1
Phenols	1				1

As can be seen in table 1.1.2, low dissolved oxygen tops the list of suspected impairments with 190 subsegments affected. This is due in part to natural conditions but is also related to high loadings of material that lead to the reduction of oxygen levels in the water. These materials come from a variety of sources including sewage, fertilizers, some sediments, and simply excess plant material in swampy areas. Mercury is second in frequency with 103 subsegments affected. This is believed to be largely derived from atmospheric deposition from coal-fired power plants. Because coal frequently contains small quantities of mercury, when it is burned the mercury goes into the atmosphere and later falls back to the ground. As a result, the sources of mercury in Louisiana waters are most likely

national and even international in origin. More information on mercury in Louisiana can be found at: http://www.deq.louisiana.gov/portal/Default.aspx?tabid=287.

Turbidity is the third-most-cited suspected cause of water quality impairment, with total suspended solids and sedimentation/siltation also frequently cited. Put simply, these suspected impairments reflect muddy water. However, excess turbidity in water bodies not normally subject to high turbidity can cause numerous problems for aquatic life. In addition, highly turbid waters are less appealing for human recreation. High turbidity is frequently caused by poor farming and forestry practices, as well as runoff from construction sites.

The frequent occurrences of nitrate/nitrite and phosphorus (total), collectively nutrients, are reflected by the high number of low dissolved oxygen-suspected impairments. These two impairments were first reported many years ago without the existence of numeric nutrient criteria in Louisiana regulations (ERC 33:IX. Chapter 11). Therefore, it is uncertain whether nutrient impairment in these waters is a reality based on numeric water quality data. LDEQ is currently in the process of developing nutrient criteria. More information on LDEQ's nutrient criteria development process can be found in Part II Chapter 2.

The suspected causes of total dissolved solids, sulfates, and chlorides are all related to the concentration of certain minerals and other natural substances in the water. While there are anthropogenic (human caused) sources of these substances, in most cases in Louisiana these reported criteria failures are due to saltwater intrusion in coastal areas. Saltwater from the Gulf of Mexico has naturally higher concentrations of these substances than the freshwater flowing into coastal areas. Water quality criteria for these substances were in some areas originally based on more freshwater conditions; therefore, as coastal areas erode and saltwater intrudes, areas with normally fresher water are now experiencing more brackish (salty) conditions. This results in more criteria exceedances and impairment. As criteria are revised on a three-year schedule, LDEQ will investigate revision of these criteria where necessary.

Suspected causes of impairment related to pesticides and herbicides appear frequently in table 1.1.2. These include carbofuran, DDT, fipronil, toxaphene, arsenic, atrazine, methoxychlor, and methyl parathion. Fortunately, with the exception of Carbofuran, DDT and Fipronil, these are generally limited to one or two reported occurrences. The presence of these suspected causes of impairment is not surprising given the large amount of acreage devoted to agriculture in Louisiana. LDEQ's Nonpoint Source Program continues to seek ways to reduce the presence of pesticides and herbicides in Louisiana waters. More information on the NPS program can be found at: http://nonpoint.deq.louisiana.gov/wqa/default.htm.

Lastly, it should be noted that those chemicals commonly associated with industrial activities are reported infrequently in table 1.1.2. These include lead, polychlorinated biphenyls (PCBs); hexachlorobenzene; hexachlorobutadiene; oil and grease; polycyclic aromatic hydrocarbons (PAHs); 1,1,1,2-tetrachloroethane; 1,2-dichloroethane; bromoform; 2,3,7,8-TCDD; 2,3,7,8-TCDF; and phenols. LDEQ currently tests for 21 volatile organic compounds (VOCs) on a quarterly basis at all ambient monitoring sites. In addition, the three Mississippi River sites are tested monthly for the VOCs plus 19 PCBs and pesticides, and 37 semi-volatiles and phenols. Between 1 January 2006 and 30 September 2009, 63,902 chemical analyses were recorded by LDEQ. Of these, only 486 results recorded detectable concentrations of the chemical analyzed for. These 486 detections resulted in no aquatic life criteria exceedances and only one human health criteria exceedance resulting in an assessment of suspected impairment due to 1,2-dichloroethane. This suspected impairment applies to both PCR and secondary contact recreation (SCR); swimming and boating, respectively. This additional suspected impairment occurred on Bayou Verdine (LA030306_00), a water body already suspected of being impaired for FWP. The suspected sources are industrial point sources in the Lake Charles area. All remaining detections were either below Louisiana and USEPA criteria, or occurred only once during the last three years. More information on procedures for assessing organic compounds can be found in Part III, Chapter 2.

Summary of Suspected Causes of Impairment to Water Quality

In addition to the suspected causes of impairment to the FWP use discussed above, five additional suspected causes of impairment were reported for the remaining possible designated uses. These additional suspected causes are listed in table 1.1.3 along with the suspected causes already enumerated in table 1.1.2. They include fecal coliform, color, temperature, chlorine, and benzo(a)pyrene (PAHs). Of these, fecal coliform was the most significant since it impacted 96 subsegments. This suspected cause of impairment is used to assess the designated uses of PCR and SCR, as well as drinking water supply (DWS) and oyster propagation (OYS). The high number of subsegments affected by this suspected cause of impairment is a reflection of the increased level of compliance still required to control municipal sewage treatment plants, small "package plant" treatment systems for neighborhoods, home

sewage systems, and agricultural runoff from pastures and animal feeding operations. The suspected cause of color is generally related to natural conditions imparting a tea color to the water. Temperature is also related to natural conditions and does not significantly impact PCR. The two reports of benzo(a)pyrene result from a swimming and sediment contact advisory on Bayou Bonfouca, while the chlorine listing is for an old evaluative assessment on Monte Sano Bayou affecting the limited aquatic life and wildlife use. Subsegment counts in table 1.1.3 for some suspected causes of impairment may have increased slightly over those in table 1.1.2 if the impairment affected both FWP and PCR or SCR.

Table 1.1.3.

Number of water body subsegments impacted by each suspected cause of impairment. Includes all designated uses. *2010 Louisiana Integrated Report* assessment.

Suspected Causes of Impairment	River	Lake	Estuary	Wetland	Total
Oxygen, Dissolved	158	26	6	3	193
Mercury in Fish Tissue	73	20	9	1	103
Fecal Coliform	81	4	10	1	96
Turbidity	66	18	4		88
Total Dissolved Solids	61	4		1	66
Nitrate/Nitrite (Nitrite + Nitrate as N)	48	7	2		57
Phosphorus (Total)	46	7	2		55
Total Suspended Solids (TSS)	44	6	1		51
Non-Native Aquatic Plants	26	16	1		43
Sulfates	36	5		1	42
Sedimentation/Siltation	30	4	1		35
Chloride	31	1		1	33
Carbofuran	23	1	1		25
Lead	17	1	1		19
pH, Low	14	3			17
Color	10	1			11
DDT	6				6
Fipronil	6				6
pH, High	2	4			6
Polychlorinated biphenyls	3	3			6
Temperature, water	2			1	3
Benzo(a)pyrene (PAHs)	2				2
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	2				2
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) (only)	2				2
Hexachlorobenzene	1	1			2
Hexachlorobutadiene	1	1			2
Oil and Grease	1	1			2
Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)	2				2
Toxaphene	2				2
1,1,1,2-Tetrachloroethane	1				1
1,2-Dichloroethane	1				1
Arsenic		1			1
Atrazine	1				1
Bromoform	1				1
Chlorine	1				1

Table 1.1.3.

Number of water body subsegments impacted by each suspected cause of impairment. Includes all designated uses. *2010 Louisiana Integrated Report* assessment.

Suspected Causes of Impairment	River	Lake	Estuary	Wetland	Total
Methoxychlor	1				1
Methyl Parathion	1				1
Phenols	1				1

Summary of Suspected Sources of Impairment to Water Quality

Table 1.1.4 provides a list of all suspected sources of impairment across all designated uses. The large number of listings for source unknown and atmospheric deposition-toxics are largely due to the high number of mercury-related fish consumption advisories in Louisiana. Mercury advisories and related issues were discussed in a previous section of the Executive Summary. The 76 additional listings for source unknown (over the number reported for atmospheric deposition) are due to a variety of suspected causes of impairment for which the LDEQ regional staff were uncertain of the source of impairment. Natural conditions and natural sources were reported for 81 and 66 subsegments, respectively. These two suspected sources are primarily related to low dissolved oxygen, chlorides, sulfates, total dissolved solids (TDS), turbidity, and low pH. These suspected causes of impairment were discussed previously. In addition to the 147 subsegments specifically reported for natural conditions and natural sources, another 92 suspected sources were reported for other source categories related to natural conditions.

Table 1.1.4.

Number of water body subsegments impacted by each suspected source of impairment. Includes all designated uses. *2010 Louisiana Integrated Report* assessment.

Suspected Source of Impairment	River	Lake	Estuary	Wetland	Total
Source Unknown	136	28	12	2	178
Atmospheric Deposition - Toxics	73	19	9	1	102
Natural Conditions - Water Quality Standards Use Attainability Analyses Needed	64	17			81
Natural Sources	52	7	6	1	66
On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)	57	1	3	1	62
Irrigated Crop Production	47	2	2		51
Non-irrigated Crop Production	45	3	2	1	51
Introduction of Non-native Organisms (Accidental or Intentional)	27	16	1		44
Package Plant or Other Permitted Small Flows Discharges	25	1	3		29
Agriculture	18	8			26
Municipal Point Source Discharges	24				24
Wildlife Other than Waterfowl	22		2		24
Naturally Occurring Organic Acids	15	4			19
Drainage/Filling/Loss of Wetlands	17			1	18
Sanitary Sewer Overflows (Collection System Failures)	15	1	1		17
Sewage Discharges in Unsewered Areas	13	4			17
Site Clearance (Land Development or Redevelopment)	15	2			17

Table 1.1.4.

Number of water body subsegments impacted by each suspected source of impairment. Includes all designated uses. *2010 Louisiana Integrated Report* assessment.

Suspected Source of Impairment	River	Lake	Estuary	Wetland	Total
Drought-related Impacts	16				16
Sediment Resuspension (Clean Sediment)	9	4	3		16
Marina/Boating Sanitary On-vessel Discharges	8		5		13
Changes in Tidal Circulation/Flushing	11				11
Unpermitted Discharge (Domestic Wastes)	11				11
Habitat Modification - other than Hydromodification	9			1	10
Industrial Point Source Discharge	8	2			10
Littoral/Shore Area Modifications (Non-riverine)	9			1	10
Managed Pasture Grazing	10				10
Impacts from Hydrostructure Flow Regulation/Modification	6	2		1	9
Petroleum/Natural Gas Activities	6		3		9
Discharges from Municipal Separate Storm Sewer Systems (MS4)	6	1	1		8
Total Retention Domestic Sewage Lagoons	8				8
Flow Alterations from Water Diversions	7				7
Rural (Residential Areas)	4	3			7
Silviculture Activities	6	1			7
Forced Drainage Pumping	6				6
Municipal (Urbanized High Density Area)	6				6
Sources Outside State Jurisdiction or Borders	6				6
Upstream Source	2	1	3		6
Silviculture Harvesting	5				5
Silviculture Plantation Management	4	1			5
Waterfowl	1	2	2		5
Crop Production (Crop Land or Dry Land)	4				4
Petroleum/Natural Gas Production Activities (Permitted)			3	1	4
Urban Runoff/Storm Sewers	3	1			4
Contaminated Sediments	2	1			3
Industrial/Commercial Site Stormwater Discharge (Permitted)	1	2			3
Lake Fertilization		3			3
Residential Districts	3				3
CERCLA NPL (Superfund) Sites	2				2
Combined Sewer Overflows	2				2
Other Spill Related Impacts	1	1			2

Table 1.1.4.

Number of water body subsegments impacted by each suspected source of impairment. Includes all designated uses. *2010 Louisiana Integrated Report* assessment.

Suspected Source of Impairment	River	Lake	Estuary	Wetland	Total
Rangeland Grazing	2				2
Runoff from Forest/Grassland/Parkland	1	1			2
Seafood Processing Operations	2				2
Streambank Modifications/Destabilization	1	1			2
Unspecified Domestic Waste	2				2
Dairies (Outside Milk Parlor Areas)	1				1
Dredging (e.g., for Navigation Channels)	1				1
Internal Nutrient Recycling		1			1
Mine Tailings	1				1
Nonpoint Source	1				1
Unspecified Land Disturbance		1			1
Unspecified Urban Stormwater	1				1

Fourteen different categories were reported as suspected sources of impairment for fecal coliform. They include: 1) on-site treatment systems, 2) package plant or other permitted small flows discharges, 3) municipal point source discharges, 4) wildlife other than waterfowl, 5) sanitary sewer overflows, 6) sewage discharges in unsewered areas, 7) marina/boating sanitary on-vessel discharges, 8) unpermitted discharge (domestic wastes), 9) managed pasture grazing, 10) total retention domestic sewage lagoons, 11) waterfowl, 12) combined sewer overflows, 13) rangeland grazing, and 14) dairies (outside milk parlor areas). As noted earlier in the discussion on fecal coliform impairments, this provides a good indication of the level of effort still needed to successfully reduce the amount of sewage and animal manure entering Louisiana's water bodies.

A large percentage of the reported suspected sources of impairment are related to what is collectively known as "nonpoint source pollution" (NPS). Nonpoint Source pollution consists of those forms of pollution caused by the runoff of stormwater from land such as agricultural fields, forestry areas, construction sites, and urban areas to name a few. In contrast, Point Sources (PS) of water pollution are those which derive from a discrete pipe such as a small or large industrial discharger or municipal sewage treatment plant. With this distinction in mind, the vast majority of water body impacts are due to NPS with 444 reported suspected sources related to NPS. A total of 114 suspected source listings were possibly related to point source discharges. 44 impacts were related to aquatic invasive species. Part II, Chapter 2 provides more information on NPS pollution and Louisiana's efforts to control it.

It is important to note that despite Louisiana's reputation for industry-related water pollution, only 32 reported suspected sources of impairment out of 1,074 are related to industrial activities. Many of these suspected industrial sources are believed to be legacy pollutants which have been or are in the process of being remediated. While industrial pollution is certainly a factor impacting Louisiana's water quality, this assessment indicates it is not as prevalent as is frequently believed. This is due in large part to stringent Clean Water Act and Louisiana Environmental Quality Act permitting and enforcement directed at industrial dischargers to Louisiana's water bodies. Part II, Chapter 2 contains more information on water quality permitting and enforcement in Louisiana.

Summary of River Quality in Louisiana

Figures 1.1.2 through 1.1.4 summarize support of the three most common designated uses for Louisiana rivers. The uses are PCR, SCR, and FWP. Other uses are established for selected water bodies in Louisiana. The status of these uses can be found in Part III, Chapter 3. Summary tables for the suspected causes and sources of impairment to Louisiana's rivers can also be found in Part III, Chapter 3. Water quality assessments for all subsegments in Louisiana can be found in Appendix A.

Figure 1.1.2.

Support for primary contact recreation (swimming) for Louisiana rivers, 2010 Integrated Report assessment. (Based on 333 assessed rivers)

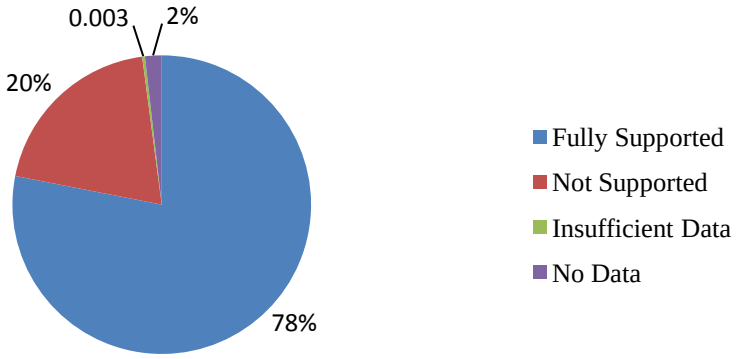


Figure 1.1.3.

Support for secondary contact recreation (boating) for Louisiana rivers, 2010 Integrated Report assessment. (Based on 345 assessed rivers)

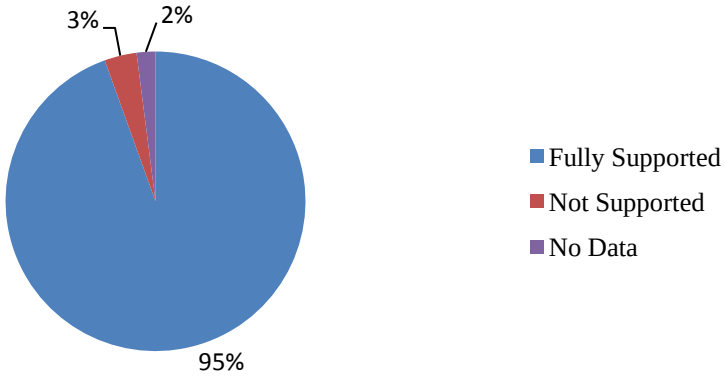
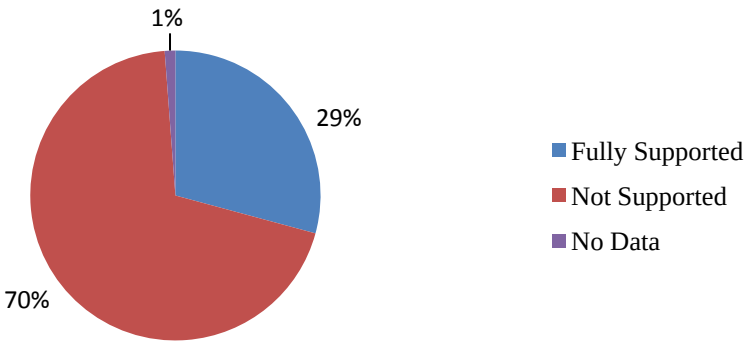


Figure 1.1.4.

Support for fish and wildlife propagation (fishing) for Louisiana rivers, 2010 Integrated Report assessment. (Based on 339 assessed rivers)



Summary of Lake Quality in Louisiana

Figures 1.1.5 through 1.1.7 summarize support of PCR, SCR, and FWP in Louisiana lakes. Other uses are established for selected water bodies in Louisiana. The status of these other uses can be found in Part III, Chapter 4. Summary tables for the suspected causes and sources of impairment to Louisiana's lakes can also be found in Part III, Chapter 4. Water quality assessments for all subsegments in Louisiana can be found in Appendix A.

Figure 1.1.5.

Support for primary contact recreation (swimming) for Louisiana lakes, 2010 Integrated Report assessment. (Based on 65 assessed lakes)

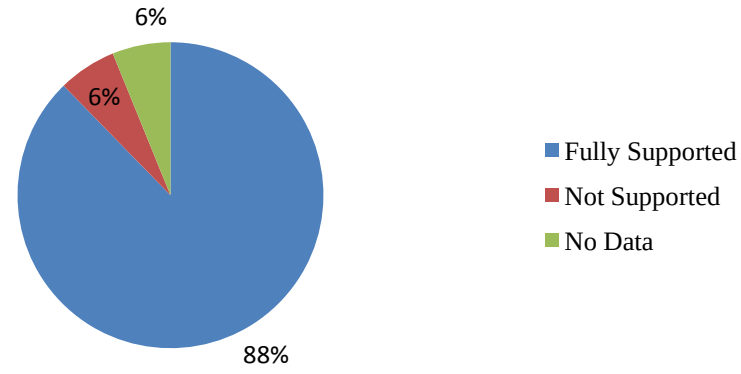


Figure 1.1.6.

Support for secondary contact recreation (boating) for Louisiana lakes, 2010 Integrated Report assessment. (Based on 65 assessed lakes)

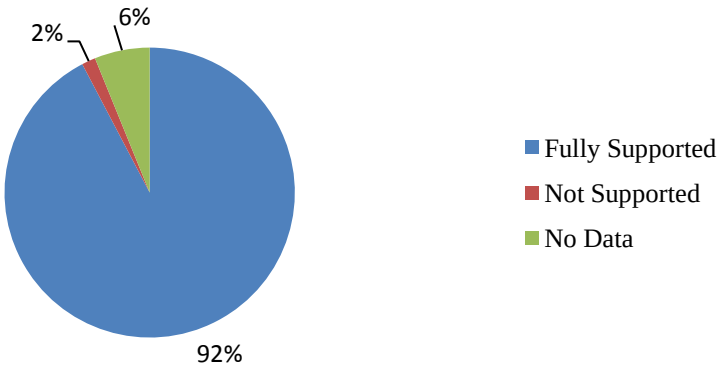
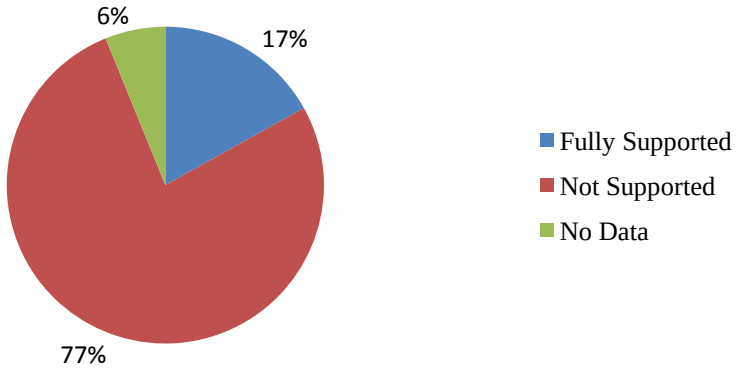


Figure 1.1.7.

Support for fish and wildlife propagation) for Louisiana lakes, 2010 Integrated Report assessment. (Based on 65 assessed lakes)



Summary of Estuary Quality in Louisiana

Figures 1.1.8 through 1.1.10 summarize support of PCR, SCR, and FWP for Louisiana estuaries. Other uses are established for selected water bodies in Louisiana. The status of these uses can be found in Part III, Chapter 5. Summary tables for the suspected causes and sources of impairment to Louisiana's estuaries can also be found in Part III, Chapter 5. Water quality assessments for all subsegments in Louisiana can be found in Appendix A.

Figure 1.1.8.

Support for primary contact recreation (swimming) for Louisiana estuaries, 2010 Integrated Report assessment. (Based on 52 assessed estuaries)

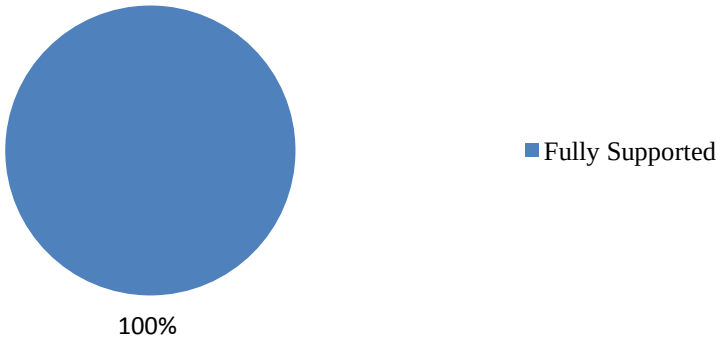


Figure 1.1.9.

Support for secondary contact recreation (boating) for Louisiana estuaries, 2010 Integrated Report assessment. (Based on 52 assessed estuaries)

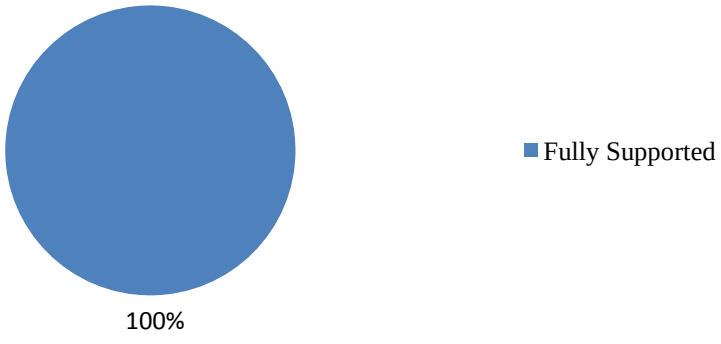
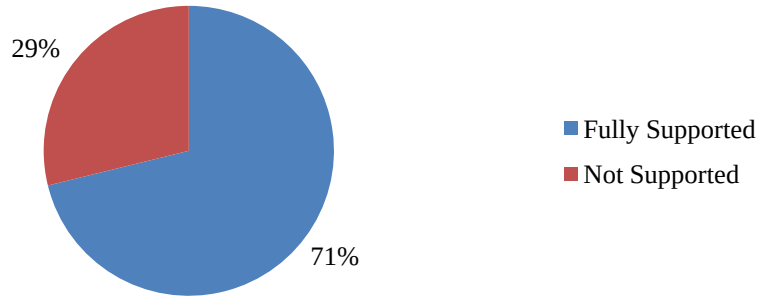


Figure 1.1.10.

Support for fish and wildlife propagation (fishing) for Louisiana estuaries, 2010 Integrated Report assessment. (Based on 52 assessed estuaries)



Summary of Wetland Quality in Louisiana

Figures 1.1.11 through 1.1.13 summarize support of PCR, SCR, and FWP in Louisiana wetlands. Other uses are established for selected water bodies in Louisiana. The status of these uses can be found in Part III, Chapter 6. Summary tables for the suspected causes and sources of impairment to Louisiana's wetlands can also be found in Part III, Chapter 6. Water quality assessments for all subsegments in Louisiana can be found in Appendix A.

Figure 1.1.11.

Support for primary contact recreation (swimming) for Louisiana wetlands, 2010 Integrated Report assessment. (Based on 6 assessed wetlands)

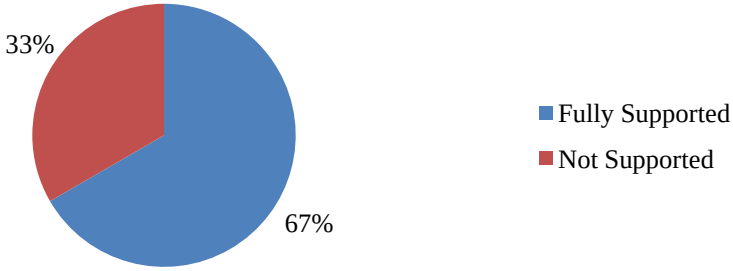


Figure 1.1.12.

Support for secondary contact recreation (boating) for Louisiana wetlands, 2010 Integrated Report assessment. (Based on 16 assessed wetlands)

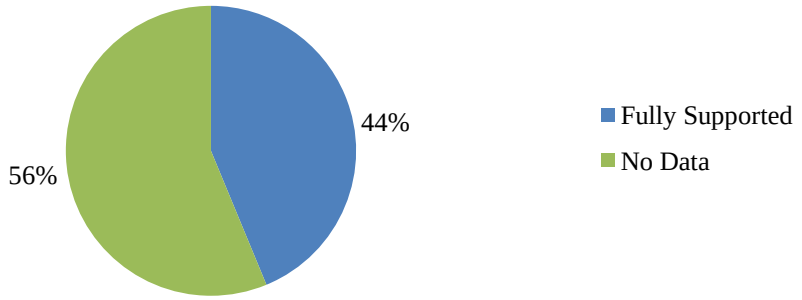
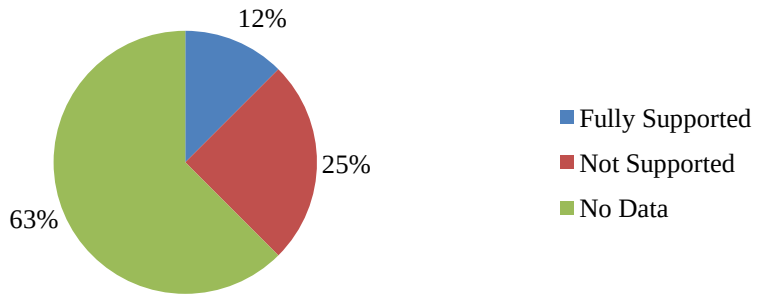


Figure 1.1.13.

Support fish and wildlife propagation (fishing) for Louisiana wetlands, 2010 Integrated Report assessment. (Based on 16 assessed wetlands)



Water Pollution Control Programs

LDEQ has been given the responsibility of managing the quality of Louisiana's surface waters by upgrading the quality where man's activities have caused degradation and by preserving the integrity of those waters where good quality exists. Water pollution controls employed by the agency include municipal and industrial wastewater discharge permits, enforcement of permit requirements, review and certification of projects affecting water quality, implementation of best management practices for nonpoint source pollution, and regular water quality monitoring and assessment of the state's surface waters.

In 1997 the LDEQ was granted National Pollutant Discharge Elimination System (NPDES) delegation by the USEPA. As a result of delegation, most facilities that discharge to waters of the state are required to obtain only one permit, a Louisiana Pollution Discharge Elimination System (LPDES) permit, rather than both an NPDES permit and a state permit as in the past. In addition to LDEQ's permitting responsibilities, grants and loans for construction and upgrade of municipal treatment facilities are also awarded by USEPA through the LDEQ. In the past, the

majority of pollution control programs have been directed at point source discharges through the issuance of wastewater permits, compliance assurance activities, and enforcement activities. While this is still the case, nonpoint source pollution control efforts continue to increase.

Water quality assessments and Total Maximum Daily Load modeling indicate that the majority of the pollutant load entering state waters comes from nonpoint sources of pollution; therefore, LDEQ implemented a watershed-based approach to reducing those loads in the water bodies where TMDLs have been completed. Presently, LDEQ utilizes both regulatory and non-regulatory mechanisms to control nonpoint sources of pollution. Urban storm water for cities with populations of 50,000 or greater and construction sites of one acre or more are regulated through the LPDES permit program. Home sewage treatment systems are regulated through the Louisiana Department of Health and Hospitals (LDHH). The Nonpoint Source Pollution Control and Aquifer Evaluation and Protection Section of LDEQ has been successful in implementing voluntary programs to control and reduce nonpoint sources of pollution. This has been done through coordination with other concerned agencies, such as the Louisiana Department of Agriculture and Forestry (LDAF), Louisiana Department of Natural Resources (LDNR), the U.S. Natural Resource Conservation Service (NRCS), parish and city governments, and the Louisiana State University (LSU) AgCenter. LDEQ will continue to monitor state waters through the four-year cyclic process to determine whether the current implementation strategy is successful in restoring and maintaining water quality and the designated uses within Louisiana.

Ground Water Quality in Louisiana

The Nonpoint Source Pollution Control and Aquifer Evaluation and Protection Section, Aquifer Sampling and Assessment Program, or ASSET Program (formerly known as the Baseline Monitoring Program) provides water quality data from freshwater aquifers around the state. Wells producing from a common aquifer are sampled in a narrow time frame. The smaller aquifers can be sampled in one or two days, and the larger aquifers may take several months to complete. When all assigned wells of a particular aquifer have been sampled, a summary report is written.

For the 2010 Integrated Report, aquifer summary data from the ASSET Program for the Mississippi River Alluvial Aquifer, a Pleistocene age aquifer, is presented. Geologically, this aquifer is one of the youngest freshwater aquifers in Louisiana and includes some of the shallowest wells and ground water in the state. This aquifer is one of the two largest aquifers in Louisiana, with an areal extent of approximately 9,950 square miles.

Data derived from monitoring the Mississippi River Alluvial Aquifer show that the ground water produced from this aquifer is very hard. Data also show that 10 of the 23 wells sampled reported detectable levels of arsenic, with 6 exceeding the USEPA Primary drinking water standard of 10 ug/L. The data also show that the ground water produced from this aquifer is of poor quality when considering non-enforceable taste, odor, or appearance guidelines, with 40 Secondary drinking water standards being exceeded in 19 wells.

PART II: BACKGROUND

Chapter 1: Louisiana Resources

Louisiana Geography and Climate

Louisiana lies entirely in the Gulf Coastal Plain physiographic province and can be divided into five natural physiographic regions: Coastal Marsh, Mississippi Alluvial Valley, Red River Valley, Terraces, and Hills. The state has twelve major river basins, which are described in Appendix A. Maximum elevations in Louisiana are located in the hills of the northwest, where the state's oldest geologic formations are found. The highest elevation in the state is only 535 feet. The lowest elevations in the state are found in the Coastal Marsh area, which extends across the southern portion of Louisiana and represents a valuable fisheries and wildlife resource. Due to levee construction, marsh filling, and subsidence, portions of south Louisiana are below sea level. Because Louisiana's coastal resources differ significantly in physical, chemical, and hydrological characteristics from inland resources, the atlas information provided below for lakes and wetlands has been broken down into two categories: inland and coastal. Those categorized as coastal receive some tidal influx, even though some of the coastal lakes and wetlands are characterized by freshwater vegetation.

Louisiana has a humid subtropical climate influenced by the extensive landmass to the north, the Gulf of Mexico to the south, and the subtropical latitude. Prevalent winds from the south/southeast bring in warm, moist air from the Gulf, resulting in abundant rainfall. The statewide annual average precipitation varies from 48 inches in the northwestern part of the state near Shreveport to 64 inches in the southeastern coastal plains near Thibodaux.

Table 2.1.1.

Geophysical data from Louisiana resources atlas.

State Population (2006-2008 Estimate - http://factfinder.census.gov)	4,342,582	
State Surface Area (Land)[1]	43,566	square miles
Percent Land	84%	
State Surface Area (Water)[1]	8,277	square miles
Percent Water	16%	
Major River Basins	12	
Rivers:		
Total River Miles	66,294	miles
Perennial	32,955	miles
Intermittent	20,667	miles
Ditches/Canals	12,672	miles
Border Miles:		
Names and Mileage of Border Rivers		
Total Mileage	484	miles
Pearl River	74	miles
Mississippi River	200	miles
Sabine River (includes Toledo Bend Reservoir)	210	miles
Lakes:		
Total Number of Fresh Water Lakes/Reservoirs	6,603	
Total Acres of Fresh Water Lakes/Reservoirs	1,078,031	acres
Number of Inland Fresh Water Lakes/Reservoirs > 1 sq. mi.	62	
Acres of Inland Fresh Water Lakes/Reservoirs > 1 sq. mi.	474,506	acres
Number of Coastal Fresh Water Lakes/Reservoirs	39	
Acres of Coastal Fresh Water Lakes/Reservoirs	239,213	acres

Wetlands:		
Fresh Water Inland Wetlands	3,000,130	acres
Coastal Wetlands (LDWF 2001)	4,088,789	acres
Swamp	467,821	acres
Fresh Marsh	1,215,656	acres
Intermediate Marsh	901,441	acres
Brackish Marsh	812,334	acres
Salt Marsh	691,537	acres
Estuaries/Bays:	7,656	square miles
Coastal Miles:	397	miles
Total Miles of Shoreline: (includes islands, bays, rivers and bayous up to head of tide water)	7,721	miles

[1] http://www.netstate.com/states/geography/la_geography.htm

Summary of Classified Uses

Louisiana has established eight designated uses for water bodies in the state. These uses, along with the total size for each use and water body type combination are shown in table 2.1.2. Designated uses and water body types are established in Environmental Regulatory Code (ERC) 33:IX.1123. The sizes found in table 2.1.2 are not reflective of the total size for water bodies found in the Louisiana Resources Atlas, above. Rather, these sizes are only for the named water bodies designated as "subsegments" in the ERC. Subsegments are watersheds or portions of watersheds delineated as management units for water quality monitoring, assessment, permitting, and enforcement purposes. A subsegment will often contain numerous smaller tributaries or distributaries within the watershed of the named ERC water body; however, assessments and summaries for Integrated Report purposes apply only to the named water body in the subsegment.

Table 2.1.2.

Total sizes of Louisiana water bodies classified for various designated uses. (Louisiana Environmental Regulatory Code 33:IX.1123)

	Water Body Type			
Classified Uses	**Rivers (miles)**	**Lakes (acres)**	**Estuaries (sq. miles)**	**Wetlands (acres)**
Primary Contact Recreation	9,193	658,210	4,954	1,025,280
Secondary Contact Recreation	9,357	658,210	4,954	1,077,053
Fish and Wildlife Propagation	9,267	658,210	4,954	1,077,053
Drinking Water Supply	1,488	264,664	-0-	464,000
Outstanding Natural Resource Waters	1,587	-0-	-0-	-0-
Oyster Propagation	470	-0-	4,268	-0-
Agriculture	2,044	425,998	-0-	-0-
Limited Aquatic Life and Wildlife Use	90	-0-	-0-	-0-

Chapter 2: Water Pollution Control Program

Watershed Approach

LDEQ reports on water quality in the state by basin subsegment. Louisiana is divided into 12 major watershed basins, and each basin is further divided into water body subsegments. This subsegment approach divides the state's waters into discrete hydrologic units. The plan for this approach was presented in the 1978 Water Quality Management Plan and underwent a major revision in 1985 to increase hydrologic consistency within each named subsegment. The final draft of the Louisiana Basin Subsegment plan was completed in 1990 and is reviewed periodically to ensure that subsegments are distinct and consistent representations of the state's hydrology. The water body subsegment system within each watershed basin provides a workable framework to evaluate the state's waters. Subsegments are periodically added or removed as water quality standards related to a subsegment or group of subsegments are revised.

Water Quality Standards Program

Louisiana's water quality standards are the foundation of LDEQ's water quality-based pollution control program and are based upon and authorized by §303(c) of the 1972 Federal Water Pollution Control Act (FWPC 1987) and its more recent amendments. Section 303(c) of the CWA outlines the basic approach to develop and maintain a state's water quality standards. Important provisions of §303(c) include the following:

- States are required to assign water quality standards to their surface waters. A water quality standard is defined as the designated beneficial use or uses plus water quality criteria to support those uses.
- States must adopt designated uses consistent with CWA beneficial uses including public water supply, propagation of fish and wildlife, recreation, agricultural uses, industrial uses, and navigation.
- State standards must protect public health, enhance water quality, and "serve the purposes of the Clean Water Act" CWA[1] (FWPCA 1987).
- The states must review their standards at least once every three years and include a public participation process.
- The USEPA has oversight over the state's standards processes. If and when a state's standards are not consistent with the applicable requirements of the CWA, the USEPA may promulgate water quality standards for that state in federal regulations.

Louisiana's water quality standards are adopted as state law and described in Title 33 of the ERC, Part IX, Chapter 11 (ERC 33:IX.1101 et seq., as amended). They are applicable to surface waters of the state and provide the basis for implementing the state's water quality programs including water discharge permitting, TMDL modeling studies, and 401 certifications. Louisiana's water quality standards include:

- A designated use or uses for waters of the state;
- Water quality criteria for these waters based on their uses;
- An antidegradation policy; and
- General policies addressing implementation issues (e.g., mixing zones, variances, low flow conditions).

Water quality assessments are conducted to meet the requirements of §305(b) and §303(d) of the CWA, and use the water quality standards to determine if a water body is meeting (attaining) its designated uses.

Designated Uses

There are currently eight designated uses adopted for Louisiana's surface waters: primary contact recreation, secondary contact recreation, fish and wildlife propagation ("subcategory" for limited aquatic life and wildlife), drinking water supply, oyster propagation, agriculture, and outstanding natural resource waters (ERC 33:IX.1111.A).

[1] "Serve the purposes of the Clean Water Act" means to include provisions for restoring and maintaining the chemical, physical, and biological integrity of State waters, and, wherever attainable, achieve a level of water quality for the protection and propagation of fish, shellfish and wildlife, and recreation "in and on" the water.

Water Quality Criteria

Water quality criteria are elements of state water quality standards expressed as constituent concentrations, levels, or narrative statements representing the quality of water supporting a particular designated use. When criteria are met, water quality will protect the designated use. Louisiana has both general and numeric criteria in ERC 33:IX.1113. General criteria are expressed in a narrative form (in concise statements) and include aesthetics, color, suspended solids, taste and odor, toxic substances (in general), oil and grease, foam, nutrients, turbidity, flow, radioactive materials, and biological and aquatic community integrity. Numeric criteria are generally expressed as concentrations (e.g., weight measured per liter) or scientific units and include pH, chlorides, sulfates, total dissolved solids, dissolved oxygen, temperature, bacteria, and specific toxic substances. USEPA has published national criteria recommendations for a number of substances, and states may incorporate these without modifications into their water quality standards. However, while states generally use USEPA guidance and recommendations in developing and adopting their own criteria, they are allowed the flexibility to develop their own methodology as well. USEPA guidance is under continuous development and revision. States review and incorporate these developments and revisions into their water quality standards as appropriate.

Human health criteria provide guidelines that specify the potential risk of adverse effects to humans due to substances in the water. Factors considered include body weight, risk level, fish consumption, drinking water intake, and incidental ingestion while swimming. Categories of criteria are then developed for each toxic substance for public drinking water supply, non-drinking water (swimming), and non-swimming water. The basic formulas used by LDEQ come from a Federal Register (FR) notice published in 1980 (45 FR 79318).

Aquatic life criteria are designed to protect all aquatic life, including plants and animals. There are two types of criteria: "acute" for short-term exposures (e.g., spills), and "chronic" for long-term or permanent exposures. One or both of the acute and chronic criteria may be related to other water quality characteristics, such as pH, temperature, or hardness. Separate criteria are also developed for fresh and salt waters. The federal water quality standards regulations allow states to develop numerical criteria or modify USEPA's recommended criteria to account for site-specific or other scientifically defensible factors. The guidance developed by USEPA for deriving water quality criteria is contained primarily in *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, published in October 1985, available from the National Technical Information Source (NTIS), publication number PB85-227049 (NTIS 1985) or from the USEPA web site at http://www.epa.gov/waterscience/criteria/library/85guidelines.pdf.

Listings of specific toxic criteria for human health and aquatic life for Louisiana are found in ERC 33:IX.1113.C.6, table 1. The development of national aquatic life and human health criteria is a dynamic process that takes into consideration the most recent and best defensible scientific information available. Therefore, LDEQ may propose to revise its water quality standards based on the most currently applicable information.

Water Quality Standards Revisions

Triennial Revision

Louisiana's Surface Water Quality Standards provide that "standards are not fixed for all time, but are subject to future revision…" (ERC 33:IX.1109.H). The basis for this review, called a "Triennial Review," is contained in the Water Quality Act (Clean Water Act) of 1987 PL 100-4 §303(c) and required under 40 CFR 131.20 (Code of Federal Regulations 2000). It is necessary from time to time to review the water quality standards to ensure criteria remain protective of existing conditions and uses, and for future water quality management goals. Part of the triennial review process includes an assessment of the state's numeric water quality standards for toxic pollutants and the occurrence of toxic pollutants in state waters. Section 303(c)(2)(B)1 of the Clean Water Act (CWA) requires states to adopt criteria for all toxic pollutants, the discharge or presence of which could interfere with designated uses of state waters, and for which USEPA has published criteria. LDEQ has adopted numeric water quality standards for toxic pollutants because of their known or suspected occurrence in Louisiana waters and potential threat to attainment of designated uses.

The water quality standards revision process is a continually occurring process as new data and information become available. However, not all revisions are considered "Triennial Revisions" by LDEQ and USEPA. Triennial revisions require a review in cooperation with USEPA-Region 6 and the US Fish and Wildlife Service. The process involves procedures for:

- Technical review of USEPA-recommended policy and criteria;
- Appropriate review by state and federal agencies and the public; and
- Promulgation and certification, and USEPA's approval of Louisiana's water quality standards (in accordance with state and federal regulations).

Technical sources of information are reviewed in order to establish the appropriate criteria for pollutants. The review takes into consideration many factors, including the state's current water quality condition, designated uses, violation summaries, wastewater discharge summaries, toxic release inventory data, survey data, and other pertinent information.

For the current triennial revision (initiated in October of 2009), public comments were solicited by LDEQ before the review began, and these comments were summarized for consideration. Based on LDEQ's review of the existing water quality standards, recent USEPA guidance and policies, and public comments, areas for possible revisions include:

- Toxic criteria;
- Subsegment delineations/descriptions (i.e., corrections and changes);
- The water quality standards format (i.e., section changes and/or renumbering);
- Outdated or redundant language; and
- Antidegradation policy and definitions.

Following a thorough technical development and review, any suggested regulations revisions are made available by LDEQ to interested groups or persons and to the general public for review and comment. Toward the end of the administrative and public review process and prior to promulgation, a public hearing(s) is held as required by the CWA and the procedure set forth in Louisiana's Revised Statutes, R.S. 49:950 (Administrative Procedures Act (APA)) et seq. Following the public hearing(s), a final draft of the proposed water quality standards revisions from the public review process is prepared which incorporates all acceptable and defensible modifications. A final review of the revisions is then made by USEPA and LDEQ, and if agreed upon, final promulgation of the rule is initiated.

Under §303(c) of the Clean Water Act, USEPA is to review and approve or disapprove any state-adopted water quality standards. This is known as the certification process, and the requirements for the process are described in federal regulations (40 CFR §131.20-§131.21). Once promulgated, an official copy of the final rule as published in the *Louisiana Register* is then transmitted by the state administrative authority to USEPA-Region 6 for final approval.

Use Attainability Analyses

Section 101(a)(2) of the CWA states it is the national goal that "wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water be attained..." To achieve the national goal, all Louisiana streams were originally assigned designated uses that were applied statewide. Criteria to support the designated uses were also assigned statewide in response to federal regulations promulgated to achieve CWA goals. Since that time, both state and federal agencies have recognized the need to establish more site-specific standards, i.e., designated uses and the criteria to support them.

Designated uses that are not existing uses may be changed or removed from water bodies, or criteria made less stringent, if it can be demonstrated that the designated uses or criteria are unattainable for any one (or more) of six reasons found in the state Environmental Regulatory Code (ERC 33:IX.1109.B.3.a-f) and federal Code of Federal Regulations (40 CFR §131.10). The mechanism for change is called a Use Attainability Analysis (UAA), which is conducted as appropriate to determine the uses and criteria a water body can attain. According to the regulations, a UAA is defined as a "structured scientific assessment of the factors affecting the attainment of a use that may include physical, chemical, biological, and economic factors" (see also 40 CFR §131.3(g) and ERC 33:IX.1105). The UAA process entails the methodical collection of data that is scientifically analyzed, summarized, and used to

make recommendations for site-specific uses and the criteria to support them. Acceptable methods used in conducting the UAA process are described in USEPA guidance documents. Several water bodies in Louisiana have site-specific criteria and uses assigned to them based on UAAs developed in close coordination with USEPA (ERC 33.IX.1123.Table 3).

UAAs for site-specific criteria and uses may be developed for a specific water body, water body type (e.g., wetlands), ecological region ("ecoregion"), or for a watershed. LDEQ has more recently used an ecoregion and "least-impacted" reference water body approach to establish water quality criteria on a water body type basis within an ecoregion (e.g. lakes, streams, bays, etc.).

Ecoregional UAAs

Protective water quality standards are based on a sound scientific rationale and contain sufficient parameters or criteria to protect the designated uses. A state may determine it is appropriate to: 1) establish site-specific or regional uses and criteria, or 2) adopt a use or subcategory of a use that is less stringent or requires less stringent supporting criteria. In the latter case, the UAA process is required to establish site-specific uses and criteria. When adopting water quality criteria for which USEPA has published nationally recommended criteria modified to reflect or establish site-specific criteria, a determination of attainable uses and criteria for a specific water body may be based on comparisons made between the water body of interest and a "least-impacted" control or "reference" water body, or on the basis of natural background conditions of reference water bodies.

The USEPA has provided guidance that supports an approach to forming management units based on ecoregions, which are spatially grouped ecological regions with similar physical, chemical, and biological characteristics. Because of the similarity and homogeneity of ecological characteristics such as climate, land use, soil type, land surface form, flora, fauna, and hydromodification within an ecoregion, watersheds may be managed on an ecoregional level. Specifically, the ecoregion-based approach may be used to develop regional or even site-specific water quality criteria, management strategies, and implementation plans for water resources.

To refine or establish criteria as appropriate on a more regional basis in Louisiana, LDEQ has investigated and USEPA supported the use of an ecoregion approach and least-impacted reference sites to establish dissolved oxygen criteria across a region for the different categories (i.e., intermittent, man-made, and naturally dystrophic) or types (i.e., streams, lakes, bays, canals, etc.) of water bodies (LDEQ 1996, DeWalt 1995, DeWalt 1997). This approach accounts for the natural characteristics indigenous to a state's ecoregions. Constituents currently being evaluated include dissolved oxygen, nutrients, and minerals.

Barataria/Terrebonne UAAs

An ecoregional use attainability analysis (UAA) was conducted to describe the water quality and biological characteristics of reference water bodies which portray the natural conditions in the Barataria and Terrebonne Basins, and to assign the appropriate designated uses and/or dissolved oxygen criteria. Physical descriptions, water quality, and biological characteristics of reference or least-impacted water bodies in these basins, which lie in the Coastal Deltaic Plains (CDP) and Lower Mississippi River Alluvial Plains (LMRAP) ecoregions, were documented in the Barataria-Terrebonne Use Attainability Analysis completed by LDEQ in 2008. Twenty-six reference sites from 13 subsegments (representing the two basins) were selected following LDEQ's ecoregion-based protocols. Water quality data (including continuous monitoring data) was collected from May 2005 to February 2008. Biological (fish) data was collected by LDEQ and evaluated along with historic Louisiana Department of Wildlife and Fisheries (LDWF) data collected from 2001 through 2005; fish data was compiled and relative measures of fish community composition were derived.

It was determined during the UAA process that seasonal occurrences of low dissolved oxygen in these ecoregions occur due to natural conditions and that a diverse fish community was present at reference sites in these basins. Recommendations for ecoregional-based and water body-specific dissolved oxygen criteria were developed by LDEQ in accordance with procedures outlined by LDEQ and USEPA-Region 6. The recommended criteria include seasonal periods and are considered by LDEQ and USEPA as more appropriate for these regions than the USEPA's nationally recommended criteria for dissolved oxygen. The recommended criteria remain protective of the fish and wildlife propagation use.

LDEQ adhered to its rule development procedures (described briefly in the "Triennial Revision" section above) while adopting the recommendations into the water quality standards. It is also a requirement of the CWA that the USEPA must approve any revisions to the water quality standards, uses, or criteria before they are implemented,

including revisions based on UAAs (40 CFR 131.21). The revised criteria were adopted into the water quality standards (as final) on 20 March 2009, and were approved by USEPA on 22 May 2009.

Louisiana's Nutrient Criteria Development Strategy

In 1998, the Office of the President of the United States announced "The Clean Water Action Plan" that included a requirement for states to develop and adopt numerical nutrient criteria. LDEQ has been working with USEPA-Region 6 toward accomplishing this goal. It has been recognized that "one size fits all" criteria for nutrients will not be appropriate, and that each state's nutrient criteria will need to be water body-specific and fit within an appropriate ecoregion framework.

USEPA has published numeric nutrient criteria recommendations for several national ecoregions. These recommendations were developed using a statistical methodology, primarily percentiles. In November 2001, USEPA issued further guidance in the form of a memorandum that clarified the flexibility that states have in their development of defensible nutrient criteria, and extended the deadline for states to have a "mutually agreed upon" nutrient criteria development plan delivered to USEPA by December 2006. LDEQ's nutrient criteria development plan (approved by USEPA on 20 June 2006) is available at http://www.deq.louisiana.gov/portal/tabid/69/Default.aspx under the bullet "Developing Nutrient Criteria for Louisiana: 2006." This plan will be updated to reflect progress in nutrient criteria development and any changes to criteria development approaches.

LDEQ evaluated the nutrient data and criteria recommendations published using USEPA's methodology and in accordance with LDEQ's nutrient criteria development plan is now proceeding to develop scientifically defensible and appropriate criteria for Louisiana's water bodies. In this regard, LDEQ is working closely with the academic community, USEPA, and the US Geological Survey (USGS) to incorporate the latest scientific research in developing defensible approaches to nutrient criteria development. LDEQ also continues to inform and seek input from stakeholders about nutrient criteria development for Louisiana water bodies. More information on the National Nutrient Strategy is available at http://www.epa.gov/ost/standards/nutrient.html.

Development of Wetland Water Quality Standards

LDEQ is developing water quality standards for wetlands. Regulations have been adopted and implementation procedures have been developed by LDEQ for discharges of treated wastewater (effluent) into natural wetlands. A preliminary study is first performed and if LDEQ determines the site is an appropriate "candidate," i.e., meets the criteria to receive a discharge, then the application and baseline studies can be completed and submitted to LDEQ.

This process, known as wetland assimilation, has been successfully implemented in southern/coastal Louisiana since 1992. The controlled release of low levels of nutrients from secondarily treated municipal wastewater into the wetlands benefits primarily the receiving wetlands and may also provide some economic benefit to the municipalities involved. These benefits have been documented in UAAs and in studies presented in peer-reviewed, published scientific papers. The program as implemented:

- Benefits subsiding wetlands by enhanced productivity and vertical accretion, and is a component of Louisiana's coastal restoration program;
- Improves water quality by reducing nutrient discharges and loads; and
- Provides the scientific basis (i.e., data) for developing water quality standards to protect Louisiana's unique wetland environment, including appropriate vegetative criteria and nutrient loading rate guidance.

Water quality standards applicable to wetlands are documented in ERC 33:IX.1.11.1105 (definitions), §1109.J (wetland types, designated uses, and applicable criteria) and §1113.B.12 (assessment of biological integrity) to protect wetland areas that may receive treated wastewater effluent. Water quality standards revisions for wetland assimilation are supported by implementation procedures outlined in the department's current Water Quality Management Plan, which is subject to USEPA oversight and approval. These procedures, though not part of the regulations, are cited in the water quality standards. For more information on wetland assimilation go to: http://www.deq.louisiana.gov/portal/tabid/2960/Default.aspx.

Water Quality Monitoring and Assessment Program

LDEQ conducts extensive surface and ground water sampling throughout Louisiana in order to obtain information regarding the quality of Louisiana's surface and ground water resources. Data obtained from this program is used to develop reports, including the 2010 Water Quality Inventory: Integrated Report, in order to inform the public, state, and federal agencies about the quality of Louisiana water. More information on this program can be found in Part III of this report.

Point Source Control Program

Introduction

Louisiana's water pollution control program is carried out through the LDEQ. The LDEQ operates to preserve the integrity of Louisiana's waters through the use of various point and nonpoint source programs. Responsibility for these programs is dispersed among the major offices of the department. These include the Office of the Secretary (regulatory development), the Office of Management and Finance (grants and contracts, information services, clean water state revolving fund), the Office of Environmental Services (municipal and industrial wastewater discharge permitting and water quality certification program), the Office of Environmental Compliance (surveillance and enforcement of permit requirements and pollution control regulations, investigation of complaints and spills, water quality assessment, review/recommendation of standards, and nonpoint source programs). An overview of LDEQ's organizational structure for all activities can be found at: http://www.deq.louisiana.gov/portal/tabid/2367/Default.aspx. Brief descriptions of the various facets of the water pollution control program not already discussed above are provided in the following sections along with recent activities.

Clean Water State Revolving Fund

The Clean Water State Revolving Fund, formerly known as the Municipal Facilities Revolving Loan Fund, provides financial assistance for the construction of projects to enhance and improve water quality in Louisiana. Loans are below market rate and may be used for water quality improvement projects in Louisiana communities.

Monies for the Revolving Fund originated with the 1987 amendments to the CWA. A new authority was created, allowing USEPA to make grants to capitalize State Water Pollution Control Revolving Funds. On the state level, R.S. 30:2011(D) (4), R.S. 30:2074(A) (4) and (B) (6), and R.S. 30:2078 provided for the establishment of the Clean Water State Revolving Fund and the required 20% state matching funds.

Loans are made for no longer than 20 years and may be repaid through sales taxes, user fees, ad valorem taxes, or a combination of funds. An interest payment on the amount drawn begins within six months of the loan closing and is billed every six months until the loan is paid in full. After a two-year construction period, loan recipients begin repayment of principal to LDEQ. That money is then available for loans to other communities. Thus, the revolving loan fund is a permanent source of funds for Louisiana municipalities.

From October 2007 through September 2009, the USEPA, through LDEQ, has awarded $19,221,655 in fund capitalization grants to Louisiana. With the required 20% state match of $3,844,331, less 4% for administration fees, this makes $22,297,120 available for loans to communities. In addition, a total of $28,930,122 of repaid "recycled" loan monies has been made available for loans. As of this date, 96 loans totaling $479,947,900 have been closed utilizing USEPA grants, state match and recycled payments from previous loans. More information on LDEQ's Clean Water State Revolving Fund can be found at: http://www.deq.louisiana.gov/portal/tabid/2148/Default.aspx and in Chapter 3 of this document.

Wastewater Discharge Permits

Wastewater permits are official authorization developed and promulgated by the Office of Environmental Services of LDEQ. The LPDES (Louisiana Pollutant Discharge Elimination System) permit establishes the wasteload content of wastewaters discharged into waters of the state. The permitting process allows the state to control the amounts and types of wastewaters discharged into its surface waters. A permit is required for every point source discharge into waters of the state of Louisiana. In 1996 LDEQ assumed responsibility for administering the permitting, compliance, and enforcement activities of the National Pollutant Discharge Elimination System (NPDES) from the USEPA. USEPA retained responsibility for the sewage sludge disposal program and authority for offshore

discharges past the three-mile territorial seas limit. More information on LDEQ's wastewater permits program can be found at: http://www.deq.louisiana.gov/portal/tabid/63/Default.aspx.

From October 2007 through September 2009, the following permits were prepared:

Table 2.2.1.

Louisiana Pollutant Discharge Elimination System water quality permits and modifications issued in Louisiana. October 2007through September 2009.

State Permit	Number of Permits	Number of Permits (including modifications)
Minor Sanitary	156	167
Major Sanitary	45	50
Minor Industrial	279	304
Major Industrial	53	68
Major MS4[1]	1	1
Stormwater General[2]	1,311	1,311
Non-Stormwater General[3]	1,444	1,444
Totals	**3,289**	**3,345**

[1]Major Municipal Stormwater Permits

[2] Does not include 40 permits re-authorized when stormwater master general permit was reissued

[3] Does not include 4,589 permits re-authorized when master general permits were reissued

Surveillance Compliance Assurance Inspections

Municipal, industrial, federal, and agricultural point source dischargers are monitored to verify compliance with permitted effluent limitations and compliance schedules. The information derived from this program can also be applied to the interpretation of state water quality data and can be used as input to water quality plan development.

The types of compliance inspections undertaken by the Inspections Division that are reported here include:

- Compliance Evaluation Inspections (CEI): Non-sampling inspections designed to verify permittee compliance with applicable LPDES/state permit requirements and compliance schedules.
- Compliance Sampling Inspections (CSI): Samples of the influent and/or effluent are collected and analyzed to determine permit compliance, in addition to the inspection activities performed in the CEIs.

The following reported numbers do not include complaint- or spill-related inspections. The following compliance inspection activities were conducted from October 2007 through September 2009:

Table 2.2.2.

Louisiana water quality compliance inspections conducted from October 2007 through September 2009.

Inspection Type	Number of Inspections
Compliance Evaluation Inspections	1,961
Compliance Sampling Inspections	95
Total Compliance Inspections	**2,056**

Surveillance Incident Investigations

The Inspections Division of the Office of Environmental Compliance (OEC) received 8,082 environmental complaints across all media (air, water, hazardous waste, underground storage tanks, etc.) from October 2007 through September 2009. Each complaint requires an incident report form and an investigation. If action is deemed necessary following the initial investigation, the investigator refers the situation to the appropriate division for enforcement action, permit action, or remedial action. The division receives notifications that include reports of oil spills, sewage overflows, bypasses, water permit excursions, chemical spills, fish kills, unusual coloring in a stream, and illegal discharges. Environmental complaints are made to the Single Point of Contact (SPOC). Notifications of emergencies and spill and release notifications are reported to the Louisiana State Police (LSP). LSP then notifies the LDEQ staff person on-call. More information on LDEQ's Inpsections Division can be found at: http://www.deq.louisiana.gov/portal/tabid/66/Default.aspx.

Table 2.2.3.

Louisiana water quality surveillance incident investigations conducted from October 2007 through September 2009.

Notification Type	Number of Notifications
Complaint Notifications	8,082
Spill Notifications	7,063
Total	**15,145**

Water Quality Certification

Water quality certification is an activity of the Municipal and General Permits Section of LDEQ. Certification is required for any federal license or permit that results in a discharge of fill material or causes a potential change to the waters of the state. Such changes include land clearing for residential and commercial development, oil and gas activities, and municipal infrastructure projects. Section 401 of the CWA requires water quality certification for all §404 permits administered by the Corps of Engineers and certain federal licenses administered through FERC (Federal Energy Regulatory Commission). From October 2007 through September 2009, 874 water quality certifications were issued by LDEQ. More information on LDEQ's water quality certification program can be found at: http://www.deq.louisiana.gov/portal/tabid/2268/Default.aspx.

Enforcement

The enforcement activities of the LDEQ Water Enforcement Section are designed to ensure that all water quality standards, rules, and regulations are handled in a rapid and consistent manner. To prevent pollution of the waters of the state and to ensure remediation in the event of pollution, the Water Enforcement Section coordinates its enforcement activities with other sections in LDEQ, especially the Water Permits Division in the OES and the Inspections Division of the OEC. Field investigations, file reviews, permit non-compliances and reviews of

discharge monitoring reports (DMRs) are all used to initiate enforcement actions. The Water Enforcement Section initiates all formal enforcement actions and follows the actions through all appropriate levels to ensure full compliance with state laws and regulations. LDEQ seeks to provide a clean, healthy environment through protection of the state's water resources by the reduction of pollution, education of the public, and consistent, open, and accountable application of standards, rules and regulations. More information on LDEQ's Water Enforcement Section can be found at: http://www.deq.louisiana.gov/portal/tabid/67/Default.aspx.

From October 2007 through September 2009, the following activities were recorded:

Table 2.2.4.

Louisiana water quality environmental enforcement actions issued from October 2007 through September 2009.

Enforcement Actions	Number
Notice Of Corrected Violations	36
Compliance Orders (CO)[1]	328
Notice of Potential Penalty (NOPP)	21
Administrative Orders	19
Penalties	128
Settlement Agreements	22

[1]Includes CO and Consolidated CO/NOPP

Table 2.2.5.

Louisiana water quality environmental penalties issued from October 2007 through September 2009.

Penalties	Dollar Value
Penalties Issued	$624,593.40
Penalties Paid	$124,683.00
Penalties Appealed	$374,470.10
Cash From Settlement Agreements	$942,622.00
Total Value of BEPs[1]	$1,048,000.00

[1]Beneficial Environmental Projects

Nonpoint Source Control Program

Introduction

The state of Louisiana has had a Nonpoint Source Management Program in place since 1993, designed to improve water quality and reduce pollution associated with land-use activities. The types of nonpoint pollution problems associated with land-use activities include sediment, nutrients, metals, organic material, and bacteria. This type of pollution is called nonpoint source (NPS) pollution because it typically does not come from a single point of discharge such as a pipe, but runs across the land when it rains and is carried through small canals and streams to major water bodies. The types of land-use activities that have been identified as contributing to NPS include: agriculture, forestry, urban, home sewage systems, construction, hydromodification, and resource extraction (sand and gravel mining). Some of these sources of pollution are managed through storm water permits, and others are managed through voluntary programs at the statewide and watershed level.

For purposes of implementing NPS pollution programs, the Louisiana Environmental Regulatory Code (ERC 33:IX.1105. Definitions) defines NPS pollution as "a diffuse source of water pollution that does not discharge

through a point source, but instead, flows freely across exposed natural or man-made surfaces such as agricultural or urban runoff and runoff from construction, mining, or silviculture activities that are not regulated as point sources."

Through the partnerships and collaborative efforts of this program, water quality has improved and water bodies have been removed from the state's §303(d) list of impaired waters. During the past few years, several success stories have been written about water quality improvements within Louisiana and published on USEPA's NPS web site http://www.epa.gov/owow/nps/Success319/. During 2009, the Louisiana Department of Environmental Quality initiated a statewide educational campaign about nonpoint source pollution called "*Be the Solution.*" It involved educational signage on billboards, printed material, and a radio and television commercial that was aired across Louisiana. All of these efforts were part of the state's Clean Waters Program that was developed to restore 25% of the state's impaired water bodies by 2012.

Through the NPS Program, the Clean Waters Program added nine watershed coordinators to work with local stakeholder groups on the watershed issues that contribute to these water quality problems. The watershed coordinators work on specific water bodies through watershed planning and implementation activities that target the pollutants of concern within their watersheds. LDEQ provides the watershed coordinators with water quality data, land-use information and any other data that they may need for their watershed planning efforts. LDEQ's NPS staff works with the watershed coordinators and also works on watersheds of their own through this same watershed planning process. LDEQ hopes that through this more focused process of watershed planning and implementation, more water bodies can be restored and removed from its §303(d) list.

An important partner in Louisiana's NPS Program is the Louisiana Department of Agriculture and Forestry (LDAF); this agency implements the agricultural component of the program. LDAF applies directly to USEPA for the incremental portion of the §319 funds and uses the funds for Best Management Practice (BMP) implementation in watersheds where TMDLs have been developed and watershed plans have been written. LDEQ and LDAF work closely on selecting impaired watersheds and sharing information on water quality data and land-use practices.

Another important partner in Louisiana's NPS Program is the Source Water Assessment Program. This program works with local communities throughout Louisiana to protect their drinking water supplies from existing and potential contamination from nonpoint sources of pollution. One of their focus areas has been reduction of bacterial problems that exist in many communities with home sewage treatment systems. Since bacterial problems cause water bodies to be listed on the §303(d) list, this program is part of the Clean Waters Program and has been instrumental in helping improve water quality and focus efforts on water bodies like Bayou Lafourche, Sibley Lake and Big Creek.

One of the remaining challenges in Louisiana is working with cities on their urban nonpoint source pollution problems. Many of the cities are now required to manage these pollutants through their storm water permits. Innovative technologies such as rain gardens, porous pavements, green roofs and small wetland detentions or swales can be very effective in retaining nutrients on site rather than moving them down stream with the storm waters. Therefore, working with cities and communities on these innovative types of solutions will continue to be a priority for LDEQ.

Section 319 of the Clean Water Act

Section 319 of the CWA was enacted to specifically address problems related to NPS pollution http://www.epa.gov/owow/nps/cwact.html. The objective of the Act was to restore and maintain the chemical, physical, and biological integrity of the nation's waters. Section 319 of the CWA instructed the governor of each state to prepare and submit a program for control and reduction of NPS pollution from nonpoint sources into navigable waters within the state by implementation of a four-year management plan, resulting in LDEQ's Nonpoint Source Management Program (LDEQ 1987).

In response to this federal law, the state of Louisiana passed Revised Statute 30:2011, signed by the Governor in 1987 as Act 272. This law directed the LDEQ, designated as the lead agency for the NPS program, to develop and implement a NPS Management Program. The NPS Management Program was developed to facilitate coordination with appropriate state agencies including, but not limited to, the Louisiana Department of Natural Resources (LDNR), the Louisiana Department of Wildlife and Fisheries (LDWF), the LDAF, and the state Soil and Water Conservation Committee, in those areas pertaining to their respective jurisdictions.

Nonpoint Source Pollution Management Program

Section 319(b) requires that states prepare a Nonpoint Source Management Plan, which includes the following elements: (All references to sections, subsections, paragraphs and subparagraphs are from CWA §319.)

- An identification of BMPs and measures which will be undertaken to reduce pollutant loadings resulting from each category, subcategory or particular NPS designated under paragraph (1)(B), taking into account the impact of the practice on ground water quality;
- An identification of programs (including, as appropriate, non-regulatory or regulatory programs for enforcement, technical assistance, financial assistance, education, training, technology transfer and demonstration projects) to achieve implementation of the BMPs by categories, subcategories and particular nonpoint sources designated under subsection (A);
- A schedule containing annual milestones for (a) utilization of the program implementation methods identified in subparagraph (B) and (b) implementation of the BMPs identified in subparagraph (A) by the categories, subcategories or particular nonpoint sources designated under paragraph (1)(B). Such schedule shall provide for utilization of the BMPs at the earliest practicable date;
- A certification of the attorney general of the state or states (or the chief attorney of any state water pollution control agency which has independent legal counsel) that the laws of the state or states, as the case may be, provide adequate authority to implement such management program or, if there is not such adequate authority, a list of such additional authorities as will be necessary to implement such management program, and a schedule and commitment by the state or states to seek such additional authorities as expeditiously as practicable;
- Sources of federal and other assistance and funding (other than assistance provided under subsections (h) and (i)) which will be available in each of such fiscal years for supporting implementation of such practices and measures and the purposes for which such assistance will be used in each of such fiscal years; and
- An identification of federal financial assistance programs and federal development projects for which the state will review individual assistance applications or development projects for their effect on water quality pursuant to procedures set forth in Executive Order 12372 as in effect on September 17, 1983, to determine whether such assistance applications or development projects would be consistent with the program prepared under this subsection; for the purposes of this subparagraph, identification shall not be limited to the assistance programs or development projects subject to Executive Order 12372 but may include any programs listed in the most recent Catalog of Federal Domestic Assistance which may have an effect on the purposes and objectives of the state's NPS pollution management program.

In 1993, the USEPA approved Louisiana's Nonpoint Source Assessment Report and Management Plan. During the next seven years, LDEQ worked cooperatively with other federal, state, and local agencies and nonprofit organizations to implement the goals and objectives of the 1993 documents. In August 2000, USEPA-Region 6 approved the revised NPS Management Plan that addressed the nine key elements that the USEPA required of all states in order to upgrade their programs. The revised plan also included the required elements of the NPS Assessment Report. LDEQ has recently revised the NPS Management Plan to include the Source Water Assessment Program and the Coastal Nonpoint Pollution Control Program. The revised NPS Plan will be available to the public after public review and approval by USEPA.

Watershed Planning and Management

USEPA and the state of Louisiana have agreed that a watershed approach to water quality planning and management is a logical, systematic way to reduce and control nonpoint sources of pollution. Watershed planning can be done for "healthy waters" or impaired waters. Through the watershed planning process, water quality data is analyzed; if the water body is impaired then total maximum daily loads (TMDLs) are developed, and watershed implementation plans are written for water bodies on the state's §303(d) list of impaired waters. The watershed plan becomes the basis for targeting the types of problems within the watershed on which to focus §319 funds in order to solve existing water quality problems. If the water body is a "healthy water body," then a watershed plan can still be written, based on the land-use stressors that may exist within the watershed and the steps that need to be taken to protect the water body from degradation. USEPA has outlined a set of elements that they believe comprise a

workable watershed plan, and LDEQ has utilized this outline as a guide to create watershed plans. The watershed plans include the following:

- Identification of geographic extent of the watershed, the measurable water quality goals, and the causes and sources that will need to be controlled to achieve the water quality goals;
- Description of NPS management practices that will need to be implemented to achieve the estimated load reductions;
- A description of the agencies and programs that are available to implement the NPS management practices;
- An identification of sources and amounts of financial and technical assistance that are estimated to be available to implement the management practices;
- An information/education component that identifies the education and outreach that will be used to implement the plan;
- A schedule for implementing the watershed plan that is reasonably expeditious;
- A description of interim, measurable milestones for determining whether NPS management practices or other control actions are being implemented;
- An adaptive implementation process that includes a set of criteria that can be used to determine 1) whether NPS loading reductions are being achieved over time; 2) whether substantial progress is being made towards attaining, or assuring continued attainment of, water quality standards and, if not, the criteria for determining whether the watershed-based plan needs to be revised; and 3) where an NPS TMDL has been established, whether the NPS TMDL needs to be revised or a new TMDL needs to be developed for waters in the watershed; and
- A monitoring component to determine whether the watershed plan is being implemented and applicable water quality standards are being attained or maintained.

Implementation

The primary objective of the Nonpoint Source Management Program is to implement BMPs that will reduce the level of NPS pollution in the surface and ground waters of the state. In addition to BMP implementation, educational programs are held at the local level in order to educate residents about NPS pollution problems and about BMPs recommended by state and federal agencies to reduce and/or correct these problems. LDEQ is focused on improving water quality in those waters that currently do not meet water quality standards and protecting healthy waters to prevent them from becoming degraded. The purpose of the watershed planning process is to target the specific areas within the impaired watersheds where BMPs need to be implemented to reduce the types of nonpoint source pollutants that exist so that the water body can be restored. The watershed planning process relies upon many partners who understand the local water quality conditions and the types of land-use activities that contribute to those conditions. The local stakeholder will be the decision maker on implementing the BMPs at the farm, the field, the home or the development site, so stakeholders need to understand why they need to take these steps and what benefits these steps will have on water quality and on their own operations.

LDEQ is focusing monitoring programs more in the specific watersheds or sub-watersheds where BMP implementation and watershed planning is occurring so that NPS load reductions and water quality improvements can be made. As these water quality improvements are made, a Success Story is written and provided to USEPA to post on the EPA web site. Through this process of watershed planning, BMP implementation and watershed level monitoring, water quality should improve and Louisiana should be able to remove more water bodies from its 303(d) list of impaired waters. For more information on the state's NPS Management Plan refer to: http://nonpoint.deq.louisiana.gov/wqa/default.htm.

Special Studies

Project Title: Bayou Lafourche Fecal Coliform Sources

The goal of this project was to identify and enumerate anthropogenic nonpoint source fecal coliform contamination from malfunctioning home package sewage systems in the Bayou Lafourche watershed within two "drinking water

protection areas" designated by the LDEQ. Bayou Lafourche is the drinking water source for 300,000 people in five parishes of southern Louisiana. The protection areas were delineated by the LDEQ as areas that could conceivably impact the four drinking water plant intake pumps in Bayou Lafourche for the City of Thibodaux's Water Treatment Plant, the Lafourche Parish Water District No. 1 North Plant on LA Hwy 1 south of Thibodaux, the Terrebonne Parish Water Treatment Plant intake pump in Lefort Canal connected to Bayou Lafourche, and the Main Lafourche Parish Plant on LA 308 at Clotilda. The objectives of the project were: 1) to determine whether onsite sewage systems are a significant contributing source of the high fecal coliform levels to Bayou Lafourche; 2) to combine targeted fecal coliform sampling with optical brightener fluorometry to identify "hot spots" that may be contributing human fecal coliforms to the bayou; and 3) to provide information that may be used by the LDEQ to encourage local governments to pass an ordinance addressing the problem of malfunctioning onsite sewage systems using best management practices. Government, academic, and environmental industry sources were solicited to obtain Geographic Information System (GIS) information, maps, and other documents and databases to help select sampling sites within the protection areas of upper Lafourche Parish. GIS data was collected for all available potential fecal coliform sources. GIS data for single dwelling package plants (6,966 in Lafourche), subdivision package plants (284), culverts (310), drinking water intake pumps (6), drainage pump stations (91), and other drainage locations were all entered in the protection area shapefiles. A sampling protocol was developed using 10 geographically related clusters of sites that are spatially located north to south in the study area with multiple sampling sites within each cluster for a total of 54 sampling sites. A rotating temporal (morning, mid-morning and evening) and spatial sampling protocol of 54 sampling sites within the 10 sampling clusters occurred 3 weeks each month during the 4 seasons of the year. GIS maps were used in conjunction with new aerial post-Hurricane Gustav GIS maps and Microsoft Virtual Earth Bird's Eye view software to identify surface drainage inaccessible by land and to see targeted package plant clusters.

Overall the project plan and method of using a combination of GIS cluster maps, Virtual Earth aerial views, and a field fluorometer to identify "hot spots" of potential anthropogenic fecal coliform input into Bayou Lafourche worked well toward meeting the goal and objectives of the project. The LDEQ is using the results of the potential sources of anthropogenic fecal or sewage input into the Bayou Lafourche drainage basin to better address the problem of meeting the USEPA TMDL for Bayou Lafourche. Ten "hot spots" at drainage points into the bayou or in canals that connect to the bayou were found in areas of clustered homes. Follow up investigation with the LDHH is in progress to confirm that home onsite sewage systems are the problem. The LDEQ also mobilized several members of its surveillance staff to inspect all facilities that required discharge permits to get these facilities under compliance. The inspectors took fecal coliform samples at every bridge crossing the bayou in an effort to assist with locating the sources of fecal coliform.

Future work to address the findings of the project includes further coordination with the LDEQ's surveillance and enforcement personnel to address any systems that may require enforcement action and also includes working with local governments in an effort to further address the fecal coliform loading. Some options involving local government include passage of an ordinance to address malfunctioning sewage systems and consolidation of individual sewage treatment system clusters into more regional, community-based systems. Also public education and the promotion of best management practices will be utilized. Thus there is a concerted effort to improve and restore the water quality within Bayou Lafourche.

Chapter 3: Cost/Benefit Assessment

Cost Information

A true cost/benefit assessment for the water quality management efforts of the LDEQ is very difficult to obtain. This is due to the fact that research on the economic value of incremental improvements in water quality is not currently available. While recent economic research has begun to place monetary values on otherwise intangible environmental benefits such as wilderness for non-consumptive recreation, such efforts have not taken place in the area of water quality. In addition to the lack of economic assessments, water quality assessment methods presently provide only a "snapshot" look at water quality as directed by §305(b) guidance provided by the USEPA. Some effort has been made to compare these biennial assessments in order to determine changes in water quality over time. However, this has been largely unsuccessful due to changes in evaluation protocols. Therefore, in lieu of a formal cost/benefit assessment of water quality improvements, the LDEQ is providing information on pollution abatement capital expenditures and operating costs for Louisiana. To place these expenditures in perspective, financial information on activities that benefit from this investment is also provided. However, there is first a general discussion of LDEQ funding for water quality protection-related activities.

Much of the water quality-related budget is self-generated through permit fees and enforcement actions; however, a portion is derived through federal grants. These include the CWA §319 grant for nonpoint source management activities, the §604 grant for state water quality management planning activities, and the §106 grant for water pollution control activities. Money from each of these grants is divided throughout the water quality-related program areas as directed by each grant and provides funding for personnel, equipment, survey work, TMDL development, water quality management planning, and monitoring. Please see table 2.3.1 for an illustration of LDEQ's approximate yearly costs to implement the CWA. Described below are a few of the programs and activities supported by each of these federal grants and state funds.

Notable among these grants in its achievements is the §319 grant for nonpoint source management issues. LDEQ continues to work with universities, city and parish officials, private industry, and the federal government on over 26 projects that target NPS pollutants from urban runoff, forestry, agriculture, sand and gravel operations, and home sewage treatment systems. During 2009, the U.S. Department of Agriculture (USDA) obligated $15,349,463 in federal funds through the Environmental Quality Incentive Program (EQIP/National Resources Conservation Service) to implement agricultural best management practices on 10,872.90 acres of land in order to reduce the amount of nonpoint source pollutants entering water bodies in the state. During this same time period, an additional $870,752 in federal funds was utilized to implement the Wildlife Habitat Incentive Program (WHIP) on 6,897 acres of private lands. During 2009, the Wetland Reserve Program (WRP) enrolled 4,545 acres of land in wetland protection programs totaling $1,175,981 in federal funds. All of these programs work with LDEQ's NPS Program to reduce water quality impacts from agricultural production within Louisiana. LDEQ continues to work closely with USDA to make progress in reducing nonpoint source pollutants and improving water quality. Part II, Chapter Two, Nonpoint Source Pollution Control has more information on this topic as well as other efforts by the Nonpoint Source Program at LDEQ. For more information on LDEQ's Nonpoint Source Program refer to: http://nonpoint.deq.louisiana.gov/wqa/default.htm.

Section 604 grant monies are used to support the development of documents known as TMDLs. Section 303(d) of the CWA requires the identification, listing, and ranking for development of TMDLs of waters that do not meet applicable water quality standards after implementation of technology-based controls. For more information on LDEQ's TMDL program refer to: http://www.deq.louisiana.gov/portal/tabid/130/Default.aspx.

Table 2.3.1.

Approximate yearly costs to implement the Clean Water Act by the Louisiana Department of Environmental Quality and its contractors.

Description	Amount
Federal Funds	
CWA Section 106 FY09	$6,710,000

Table 2.3.1.

Approximate yearly costs to implement the Clean Water Act by the Louisiana Department of Environmental Quality and its contractors.

Description	**Amount**
CWA Section 604(b) FY09	$100,000
CWA Section 319 FY09	$2,690,000
Total Federal Funds	**$9,500,000**
State Funds	
Environmental Trust Fund and Other Fees (FY09)	$11,910,000
General Fund (FY09)	$420,000
Total State Funds	**$12,330,000**
Grand Total	**$21,830,000**

Finally, the §106 grant provides funding support for the entire water pollution control/water quality management program. Activities supported by the §106 grant include ambient water quality monitoring, assessment of ambient water quality data, development of the Water Quality Inventory (now known as the Integrated Report), revision of Louisiana's Water Quality Management Plan, development and revision of surface water quality standards, development and issuance of wastewater discharge permits, compliance inspections, complaint investigations, and development of enforcement actions. §106 grant funding for FY 2009 was approximately $6,736,000.00.

The Clean Water State Revolving Fund Program provides financial assistance for the construction of projects to enhance and improve water quality in Louisiana. Loans are below market rate and may be used for water quality improvement projects in Louisiana communities. Monies for the Revolving Loan Program originated with the 1987 amendments to the CWA. A new authority was created, allowing USEPA to make grants to capitalize State Water Pollution Control Revolving Funds. On the state level, R.S. 30:2011(D)(4), R.S. 30:2074(A)(4) and (B)(6), and R.S. 30:2078 provided for the establishment of the Municipal Facilities Revolving Loan Fund (now known as the Clean Water State Revolving Fund) and the required 20% state matching funds. Loans are made for no longer than 20 years and may be repaid through sales taxes, user fees, ad valorem taxes, or a combination of funds. An interest payment on the amount drawn begins within six months of the loan closing and is billed every six months until the loan is paid in full. After a two-year construction period, loan recipients begin repayment of principal to LDEQ. That money is then available for loans to other communities. Thus, the revolving loan fund is a permanent source of funds for Louisiana municipalities.

As of January, 2010, the USEPA, through LDEQ, has awarded $297,581,423 in fund capitalization grants to Louisiana. With the required 20% state match of $59,516,285, less 4% for administration fees, this makes $345,194,447 available for loans to communities. In addition, a total of $189,584,212 of repaid “recycled” loan monies has been made available for loans. As of January 2010, 97 loans to communities totaling $508,147,900 have been closed utilizing USEPA grants, state match, and recycled payments from previous loans. Another 36 requests for loans totaling $179,837,989 have been received and are in the application process. For more information on the Clean Water State Revolving Fund refer to: http://www.deq.louisiana.gov/portal/tabid/2148/Default.aspx.

Data on pollution abatement capital expenditures and operating costs from the U.S. Bureau of the Census publication, “Current Industrial Reports—Pollution Abatement Costs and Expenditures: 2005,” has been included to provide estimates of costs to industry related to water quality protection and improvement. For 2005, the most recent year for which data is available, industry in Louisiana spent $89.2 million in capital expenditures to protect water quality, with the petroleum industry ($61.2 million), chemical industry ($25.3 million), and paper industry ($0.8

million) leading in dollars spent. For the same period, water quality-related pollution abatement operating costs for Louisiana industry totaled $530.4 million with spending led by the chemical sector ($301 million), petroleum industry ($173.1 million), and paper industry ($40.6 million). This represents a $619.6 million outlay for water pollution control-related expenses (U.S. Census Bureau 2008).

In an attempt to place state and industry expenditures in perspective and to provide an approximation of a cost/benefit assessment, information is provided below on the size of Louisiana's water resource and its direct and indirect economic benefits to the state.

Benefits Information

Louisiana's water resources occupy 8,277 square miles of the total state surface area of 51,843 square miles[1]. As a result, with regard to water quality LDEQ is responsible for the protection of approximately 16% of the total surface area of the state. In many instances protection of surface waters also involves the management of storm water runoff from land based activities such as farming, aquaculture, forestry, and suburban/urban areas. This greatly increases the effective area for which the LDEQ is either directly or indirectly responsible.

The Louisiana Department of Wildlife and Fisheries 2007-2008 Annual Report (LDWF 2009) states that the shrimp fishery is Louisiana's most valuable commercial fishery. Louisiana continued to lead the nation in shrimp landings with almost 70.4 million pounds landed in 2007. The dockside value was about $139.3 million. Additionally, Louisiana blue crab landings for 2007 totaled 43.9 million pounds, bringing in $44.8 million dockside, and stone crab landings came in at 4,253 pounds, valued at $11,417 dockside. The state consistently produces one of the largest and most valuable oyster resources in the nation, averaging over 14 million pounds per year. The dockside value was nearly $40.2 million in 2007. The total value of commercial landings exceeded $290 million in 2007, an increase of $19 million over 2006 as the Louisiana commercial fishing industry continues to rebound from the impacts of 2005 Hurricanes Katrina and Rita. The total 2006 economic effect of the commercial fisheries industry in Louisiana was $2.4 billion (Southwick Assoc. 2008).

The LDWF also surveyed the licensed recreational fishery in the state. More than 1.2 million anglers took over 4.6 million marine recreational fishing trips in 2007. About 18.7 million spotted sea trout and 6.1 million red drum were caught in Louisiana in 2007. In 2006, Louisiana saltwater anglers, both resident and non-resident, spent approximately $472 million for fishing trips, equipment, and other miscellaneous retail expenses, while freshwater anglers spent around $592 million. The total 2006 economic impact of recreational anglers to Louisiana was approximately $1.71 billion. In 2006, recreational boating retail sales were $981.6 million with a $1.33 billion total economic effect (Southwick Assoc. 2008). A survey presented in the 2009-2013 Louisiana Statewide Comprehensive Outdoor Recreation Plan revealed that "Fishing/Crabbing" was #1 out of the *Top 10 2008 Important Outdoor Recreational Activities Among Households*, and "Public Access to State Waters" was #4 (La. Ofc. of State Parks (LOSP) 2009).

Both recreational and commercial fishing have an obvious relationship to Louisiana's water resources. Not so obvious is the connection between high quality water resources and hunting/non-consumptive wildlife activities. Over 161,600 deer hunters participated in hunting activities during the 2007-2008 deer season. There were also 41,200 dove hunters, 2,900 quail hunters, 4,000 woodcock hunters, and 17,400 turkey hunters (LDWF 2009). Total retail sales associated with hunting in Louisiana in 2006 were $594 million with a total economic effect of $975 million (Southwick Assoc. 2008). In 2006, an estimated 738,000 participants engaged in wildlife watching, resulting in retail sales of $312.4 million in Louisiana and a total economic effect of $517.1 million (U.S. Fish and Wildlife Service 2008). Alligator and fur harvesting and amphibian/reptile collection resulted in proceeds of $62.4 million received by Louisiana harvesters, resulting in a total economic effect of $113 million to the state. The above mentioned fishing, hunting, and wildlife activities generated an estimated $4.61 billion in retail sales, $6.75 billion in total economic effect, $446.2 million in state and local tax revenues, and supported 76,700 jobs in 2006 after adjusting for multiple counting of boat purchases (Southwick and Assoc. 2008). Figures are likely significantly higher for 2009 as the state has continued to recover from 2005 hurricane impacts. The wildlife, fishing, and boating resources of Louisiana thus generate substantial economic benefits to state residents and to the common good. Industry investment in water quality pollution abatement capital expenditures and operating costs protects a multibillion-dollar industry. This financial outlay typically amounts to less than 10% of the value of the annual benefits. So it is quite clear that the proven financial returns to Louisiana are well worth the costs incurred.

[1] http://www.netstate.com/states/geography/la_geography.htm

It has been recognized that terrestrial wildlife and especially waterfowl are dependent on the availability of high quality waters. Moreover, hunters and non-consumptive users alike are less likely to participate in their preferred activities in areas of questionable water and aesthetic quality. An all-encompassing approach to environmental and resource management requires that consideration be given to all wildlife, aquatic and terrestrial, because all require clean water for their survival. While the total contribution of fishing, hunting, and non-consumptive recreation cannot be directly related to water resources, almost all of it can be associated with the need for clean water. In a 2005 survey of 403 Louisiana citizens by the Southeastern Association of Fish and Wildlife Agencies (SEAFWA), "Polluted water/water quality" was named the second most important fish and wildlife issue, led only by "Habitat loss" (SEAFWA 2005).

Although the connection is not so direct, clean water is also important to the tourism industry. The Louisiana Department of Culture, Recreation and Tourism (LDCRT) report "Louisiana Tourism Forecast: 2009-2013" estimated that 23.3 million U.S. resident visitors would visit Louisiana in 2009. State recreational areas cover over 1,510,298 acres (LOSP 2009). Travel statistics indicate that 17% of resident visitors participated in some sort of outdoor activity during their visit, as did 6% of international visitors. Visitors to state parks and historic sites spent nearly $26 million in 1999. The impact of state parks and historic sites is $63 million per year due to recurring operating expenditures, new construction, and the indirect impact visitor spending has on local economies (La. Ofc. of Tourism (LOT) 2004). In FY 2008-09, over 2 million visitors came to Louisiana State Parks and Historic sites. The number of visitors statewide is predicted to return to 2004 levels by 2010, with an estimated 24.3 million people spending a predicted sum of $10.2 billion (LOT 2008). Out-of-state visitors to state parks spend almost $12 million in Louisiana annually (LDCRT 2009). The Louisiana DCRT estimates that visitor spending at state parks returns $3.23 in state taxes for every dollar spent on park operation and maintenance (University of New Orleans (UNO), Louisiana State University (LSU), McNeese State University (MSU), Louisiana State University Shreveport (LSUS) 2006). In the Louisiana Office of State Parks Strategic Plan for FY 08-09—12-13, Objective #1 is "To increase the number of visitors served by the park system to at least 2,500,000 by the end of FY 2012-2013." To meet this objective, Strategies 1.1 (Maintain and operate all state park sites and facilities according to the highest standards of quality) and 1.9 (Introduce new initiatives such as the American Wetlands Program and participation in other eco-cultural tourism programs in order to further enhance visitation) are directly dependent on water quality (LDCRT 2008a and b). As public private partnerships continue to play an important role in our educational system, parks system employees participate in environmental educational projects such as Ocean Commotion, EarthFest, and the LSU Coastal Roots Program.

There are also 23 National Wildlife Refuges in the state, all crisscrossed by Louisiana waterways. People use this system of the U. S. Forest Service (USFS) for hunting, fishing, birding, photography, and environmental education while spending money in localities near these sites. For more information on the USFS refer to: http://www.fws.gov/refuges/refugeLocatorMaps/Louisiana.html.

According to the "2008 Louisiana Tourism Satellite Account (LTSA): An Update," (Terrell and Bilbo 2009) in 2008, tourists in Louisiana spent $9.5 billion. Approximately $864 million of that spending was for taxes, fees, and licenses, a 10% increase over 2007 (LOT 2009a). Of that amount, $219 million went to local taxes. Travel and tourism now account for 8.2% of state government revenues (LOSP 2009). Local governments received over $170 million in sales tax revenue from visitors. 144,900-plus people (7.7% of the state workforce) work directly in the Louisiana travel industry; the LTSA report also states that 59,349 additional Louisiana jobs are created as an indirect effect of travel and tourism expenditures.

On 20 September 2005, Louisiana DCRT unveiled "Louisiana Rebirth: Restoring the Soul of America," its strategic plan to rebuild Louisiana's tourism and cultural industries after the destruction inflicted by Hurricanes Katrina and Rita. The fifth guiding principle of the plan states, "We will rebuild to preserve and magnify the awe-inspiring and unique natural resources that make up Louisiana." (LOT 2006). "Louisiana Rebirth" includes many activities and destinations centered around our state parks and historic sites. The LDCRT is currently presenting a national advertising campaign, "This is My Louisiana," designed to invite visitors back to the state and dispel misconceptions about Louisiana as a travel destination using video clips and print ads featuring celebrities (LOT 2009b). In the past year, three major motion picture projects have filmed at Office of State Parks sites, creating further national and international interest in Louisiana and its beautiful natural environment (LDCRT 2009). Although not all of Louisiana's outdoor recreational and scenic opportunities are water-based, it can safely be assumed that water quality is a factor in the overall environmental perception of travelers and that outdoor recreation represents an important part of Louisiana's tourism industry. Because water quality often plays an important part in this recreation, it is imperative that it be enhanced and protected.

As can be seen, Louisiana invests a great deal of money in its efforts to enhance and maintain water quality in Louisiana. In return, the citizens of Louisiana and visitors to the state derive a number of benefits, both financial and aesthetic, from the state's abundance of water bodies. With the combined efforts of the LDEQ, industry and the citizens of Louisiana, our waters will continue to provide abundant recreational and commercial benefits for everyone.

PART III: SURFACE WATER MONITORING AND ASSESSMENT

Chapter 1: Surface Water Monitoring Program

The surface water monitoring program of the Office of Environmental Compliance (OEC) of LDEQ is designed to provide data for the following objectives:

- measure progress toward achieving water quality goals at state and national levels;
- establish and review the state water quality standards;
- determine the assimilative capacity of the waters of the state; and
- establish permit limits for wastewater discharges.

The surface water monitoring program is composed of an ambient water quality monitoring network, intensive surveys, special studies, and wastewater discharge compliance sampling. Some components of the state water monitoring program are briefly described below.

Ambient Water Quality Monitoring Network

The primary use of the data from the Ambient Water Quality Monitoring Network (AWQMN) is to determine if water quality standards are being attained. To accomplish this, core indicators are monitored and used to determine designated use support (table 3.1.1). Data may also be used for/by other programs within LDEQ (e.g., standards/criteria determination, modeling, permitting, project planning) and external entities.

Data will be collected systematically to obtain water quality monitoring data on selected water subsegments defined in the Surface Water Quality Standards (ERC 33:IX Chapter 11). The current approach to ambient surface water monitoring consists of a four-year rotating sampling plan with approximately one-fourth of the selected subsegments in the state sampled each year. Long-term monitoring sites are located in 10 of the 12 basins and will be sampled every year throughout the four-year cycle. Under this plan LDEQ conducts a complete census of selected subsegments identified in ERC 33:IX.1123, table 3 during the four-year rotation. There are, however, some subsegments that are difficult to sample within the physical and time constraints imposed upon the regional staff. These difficult-to-monitor subsegments will be evaluated individually to determine what type of monitoring and assessment can best be performed to assess the water quality of that subsegment.

Beginning with the 2009-2010 AWQMN sample site rotation, the number of sites being sampled was reduced due to state budget constraints. As budget restrictions ease in the future, LDEQ will resume AQWMN sampling at the level described in this report and the ambient monitoring quality assurance project plan (QAPP).

Inspections Division personnel conduct the ambient network sampling. At each sampling site, the sample collector takes *in situ* field measurements and collects water samples for laboratory analysis for the parameters outlined in table 3.1.1.

Mercury Monitoring Program / Fish Tissue Monitoring Activities

With the exception of a statewide mercury monitoring program, the Inspections Division does not maintain a regular fish tissue monitoring program. However, fish are frequently sampled in response to significant complaints, as a result of enforcement actions, or in response to other problems as they occur. Results of tissue analyses are forwarded to the LDEQ and LDHH for statistical and risk assessment analysis. If it is determined there is a need for a health advisory, press releases are prepared for public dissemination of the information. More information on Louisiana's mercury monitoring program can be found at: http://www.deq.louisiana.gov/portal/Default.aspx?tabid=287. More information on Louisiana's fish tissue and advisory program can be found at: http://www.deq.louisiana.gov/portal/Default.aspx?tabid=1631.

Table 3.1.1.

Designated uses for Louisiana water bodies and the core indicators used to determine water quality standards attainment.

Designated Use	Core Indicators	Basis for Use Support Decision
Fish and Wildlife Propagation	Dissolved Oxygen (mg/L) (Routine grab ambient)	Percent exceedance[1]
	Dissolved Oxygen (mg/L) (Continuous Monitoring)	Percent exceedance[1]
	Temperature	Percent exceedance
	pH	Percent exceedance
	Chloride	Percent exceedance
	Sulfate	Percent exceedance
	Total Dissolved Solids	Percent exceedance
	Turbidity	Percent exceedance
	Toxic Substances	Less than 2 exceedances in 3 years[2]
	Metals	Less than 2 exceedances in 3 years[2]
Limited Fish and Wildlife Use	Dissolved Oxygen	Percent exceedance[1]
	Dissolved Oxygen (mg/L) (Continuous Monitoring)	Percent exceedance[1]
Primary Contact Recreation	Fecal Coliform	Percent exceedance
	Temperature	Percent exceedance
	Toxic Substances	Less than 2 exceedances in 3 years[2]
Secondary Contact Recreation	Fecal Coliform	Percent exceedance
	Toxic Substances	Less than 2 exceedances in 3 years[2]
Drinking Water Supply	Color	Percent exceedance
	Fecal Coliform	Percent exceedance
	Toxic Substances	Less than 2 exceedances in 3 years[2]
	Metals	Less than 2 exceedances in 3 years[2]
Outstanding Natural Resource Waters	Turbidity	Percent exceedance
Agriculture	None (indicated by support of other designated uses)	
Oyster Propagation	Fecal Coliform	Percent exceedance

1. LDEQ's AWQMN Dissolved Oxygen (DO) routine grab samples are used as an initial screening for DO criteria assessments. In the event the criterion is not met, continuous monitoring for DO may be initiated.
2. LDEQ has adopted a screening approach for water quality assessment decisions based on metals and toxics (also referred to in this document as organic compounds) data.

Intensive Water Quality Surveys

The Water Surveys Section of LDEQ conducts intensive stream surveys to provide physical, chemical, and some biological data necessary to define water quality problems; calibrate and verify mathematical models for development of TMDLs and wasteload allocations (WLAs); and provide additional data for assessments, permitting purposes, the revision of water quality standards, and the development and revision of the state water quality management plan. Table 3.1.2 includes stream surveys conducted in the Lake Pontchartrain Basin during 2008 and 2009.

Table 3.1.2.

Stream surveys conducted by the LDEQ Water Surveys Section for development of Total Maximum Daily Load and Wasteload Allocations.

Year	Subsegment	Water Body
2008	040301 and 040302	Upper Amite River
	040305	Colyell Creek

	040303 and 040402	Lower Amite River
	040603	Selsers Creek
	040903 and 040904	Bayou Cane
	040901 and 040902	Bayou Lacombe
2009	040302	Jones Creek and Clay Cut Bayou
	040905 and 040906	Bayou Liberty
	040907 and 040908	Bayou Bonfouca
	040801	Upper Tchefuncte River
	040802	Lower Tchefuncte River
	040804	Bogue Falaya and Abita Rivers

Total Maximum Daily Load Development Program

Total Maximum Daily Load Status

The Water Quality Monitoring and TMDL Section of LDEQ has focused on TMDL development for water bodies listed on the §303(d) list for low dissolved oxygen, nutrients, and metals and will continue to do so until all water bodies requiring a TMDL have been addressed. Based upon an agreement between LDEQ and USEPA, some TMDLs are developed by USEPA and/or USEPA contractors; these TMDLs are submitted to LDEQ for review. TMDL progress is shown in tables 3.1.3 and 3.1.4. More information on USEPA's TMDL program can be found at http://www.epa.gov/waters/ir/index.html.

Table 3.1.3.

Louisiana Department of Environmental Quality Total Maximum Daily Load (TMDL) progress from January 01, 2008 to December 31, 2009.

TMDLs Developed by LDEQ and Approved by USEPA			
Subsegment Number	**Basin**	**Title**	**Date Finalized**
110501	Sabine River Basin	West Anacoco Creek Watershed TMDL For Biochemical Oxygen-Demanding Substances and Nutrients	1/15/2008
120302	Terrebonne Basin	Bayou Folse Watershed TMDL for Biochemical Oxygen-Demanding Substances and Nutrients	4/15/2008
120301		Bayou Terrebonne Watershed TMDL for Biochemical Oxygen-Demanding Substances and Nutrients	4/15/2008
120303		Bayou L'Eau Bleu Watershed TMDL for Biochemical Oxygen-Demanding Substances and Nutrients	4/15/2008
120504		Petit Caillou Watershed TMDL for Biochemical Oxygen-Demanding Substances and Nutrients	4/15/2008
120206	Terrebonne Basin	Grand Bayou Watershed TMDL for Biochemical Oxygen-Demanding Substances	4/15/2008
060201	Vermilion-Teche River Basin	Bayou Cocodrie TMDL for Dissolved Copper	8/12/2008
101506	Red River Basin	Big Creek Watershed TMDL for Biochemical Oxygen-Demanding Substances	8/12/2008

Draft TMDLs developed by the LDEQ and pending USEPA approval.			
Subsegment Number	**Basin**	**Title**	**Date Public Noticed**
040303	Lake Pontchartrain	Draft Lower Amite River TMDL for Biochemical Oxygen-Demanding Substances and Nutrients	9/23/2009
040201		Draft Bayou Manchac TMDL for Biochemical Oxygen-Demanding Substances and Nutrients	9/23/2009

Table 3.1.4.

Total Maximum Daily Loads developed by USEPA and reviewed by LDEQ.

Basin	Subsegment Number	Water Body	Parameters	Status	Date Finalized
Atchafalaya River	010301	West Atchafalaya Basin Floodway	Mercury	Draft 10/17/2008	
	010401	East Atchafalaya Basin and Morganza Floodway South to I-10 Canal	Mercury	Draft 10/17/2008	
	010501	Lower Atchafalaya Basin Floodway	Mercury	Draft 10/17/2008	
	010601	Crow Bayou, Bayou Blue, and Tributaries	Chloride, Sulfate and TDS	Draft 11/18/2008	
Mississippi River	070203	Devil's Swamp Lake and Bayou Baton Rouge	Dissolved Lead and Turbidity	Draft May 2009	
	070503	Capitol Lake	Dissolved Oxygen, Total Phosphorus, and Total Nitrogen	Draft May 2009	
Pearl River	090101	Pearl River from Mississippi State Line to Pearl River Navigation Canal	Fecal Coliform and Mercury	Final	11/4/2008
	090102	East Pearl River from confluence with Holmes Bayou to I-10	Mercury	Final	11/4/2008
	090103	East Pearl River from I-10 to Lake Borgne	Mercury	Final	11/4/2008
	090104	Peters Creek	Fecal Coliform	Final	11/4/2008
	090105	Pearl River Navigation Canal from Pools Bluff to Lock. No. 3	Dissolved Oxygen	Final	11/4/2008
	090105	Pearl River Navigation Canal from Pools Bluff to Lock. No. 3	Mercury	Final	11/4/2008
	090106	Holmes Bayou	Turbidity and Mercury	Final	11/4/2008
	090107	Pearl River from Navigation Canal to Holmes Bayou	Mercury	Final	11/4/2008

Table 3.1.4.

Total Maximum Daily Loads developed by USEPA and reviewed by LDEQ.

Basin	Subsegment Number	Water Body	Parameters	Status	Date Finalized
	090201	West Pearl River from headwaters to Holmes Bayou	Turbidity and Mercury	Final	11/4/2008
	090202	West Pearl River from Holmes Bayou to the Rigolets	Turbidity	Final	11/4/2008
	090202-05126	Morgan River from Porters River to West Pearl River	Mercury	Final	11/4/2008
	090203	Lower Bogue Chitto from Navigation Canal to Wilson Slough	Mercury	Final	11/4/2008
	090204	Pearl River Navigation Canal below Lock No. 3	Dissolved Oxygen and Mercury	Final	11/4/2008
	090205	Wilson Slough	Mercury	Final	11/4/2008
	090206	Bradley Slough	Mercury	Final	11/4/2008
	090207	Middle Pearl River and West Middle Pearl River	Dissolved Oxygen and Mercury	Final	11/4/2008
	090207-5112	Morgan Bayou	Mercury	Final	11/4/2008
	090301	Pushepatapa Creek	Fecal Coliform	Final	11/4/2008
	090401	Bogue Lusa Creek	Fecal Coliform	Final	11/4/2008
	090501	Bogue Chitto River from Mississippi state line to Pearl River Navigation Canal	Turbidity	Final	11/4/2008
	090501	Bogue Chitto River from Mississippi state line to Pearl River Navigation Canal	Mercury	Final	11/4/2008
	090502	Big Silver Creek	Fecal Coliform	Final	11/4/2008
	090505	Bonner Creek	Fecal Coliform	Final	11/4/2008
	090506	Thigpen Creek	Fecal Coliform	Final	11/4/2008
Red River	100404	Cypress Bayou Reservoir	Dissolved Oxygen	Final	4/2/2008
	100405	Black Bayou	Dissolved Oxygen	Final	4/2/2008
	100406	Flat River	Dissolved Oxygen and Nutrients	Final	4/2/2008
	100501	Bayou Dorcheat-Arkansas state line to Lake Bistineau	Dissolved Oxygen and Mercury	Final	4/2/2008
	100601	Bayou Pierre headwaters to Sawing Lake	Dissolved Oxygen and Nutrients	Final	4/2/2008

Table 3.1.4.

Total Maximum Daily Loads developed by USEPA and reviewed by LDEQ.

Basin	Subsegment Number	Water Body	Parameters	Status	Date Finalized
	100602	Boggy Bayou	Dissolved Oxygen and Nutrients	Final	4/2/2008
	100702	Black Lake Bayou-Webster-Bienville Parish Line to Black Lake	Dissolved Oxygen	Final	4/2/2008
	100703	Black Lake and Clear Lake	Dissolved Oxygen	Final	4/2/2008
	100803	Saline Bayou from Saline Lake to Red River	Dissolved Oxygen	Final	4/2/2008
	101301	Rigolette Bayou	Dissolved Oxygen	Final	4/2/2008
	101302	Iatt Lake	Dissolved Oxygen	Final	4/2/2008
	101501	Big Saline Bayou	Dissolved Oxygen and Nutrients	Draft	1/13/2009
	101604	Lake Concordia	Dissolved Oxygen	Final	4/2/2008
Sabine River	110401	Bayou Toro to LA Hwy 473	Dissolved Oxygen	Final	4/2/2008
Terrebonne	120102	Bayou Poydras	Dissolved Oxygen and Nutrients	Final	9/30/2008
	120103	Bayou Choctaw	Dissolved Oxygen and Nutrients	Final	9/30/2008
	120105	Chamberlin Canal	Dissolved Oxygen and Nutrients	Final	9/30/2008
	120106	Bayou Plaquemine	Dissolved Oxygen and Nutrients	Final	9/30/2008
	120107	Upper Grand River and Lower Flat River	Dissolved Oxygen and Nutrients	Final	9/30/2008
	120109	Intracoastal Waterway	Dissolved Oxygen and Nutrients	Final	9/30/2008
	120110	Bayou Cholpe	Dissolved Oxygen and Nutrients	Final	9/30/2008
	120202	Bayou Black-Intracoastal Waterway to Houma	Dissolved Oxygen and Nutrients	Final	10/8/2008
	120204	Lake Verret and Grassy Lake	Dissolved Oxygen and Nutrients	Final	9/30/2008

Table 3.1.4.

Total Maximum Daily Loads developed by USEPA and reviewed by LDEQ.

Basin	Subsegment Number	Water Body	Parameters	Status	Date Finalized
	120205	Lake Palourde	pH	Final	4/2/2008
	120206	Grand Bayou & Little Grand Bayou	Total Suspended Solids	Final	4/2/2008
	120304	Intracoastal Waterway-Houma to Larose	Dissolved Oxygen and Nutrients	Final	9/30/2008
	120401	Bayou Penchant-Bayou Chene to Lake Penchant	Dissolved Oxygen and Nutrients	Final	9/30/2008
	120402	Bayou Chene-from Intracoastal Waterway to Bayou Penchant	pH	Final	4/2/2008
	120403	Intracoastal Waterway-Bayou Boeuf Locks to segments 1204 & 1203 at Houma	Dissolved Oxygen and Nutrients	Final	9/30/2008
	120404	Lake Penchant	Dissolved Oxygen and Nutrients	Final	9/30/2008
	120405	Lake Hache, Lake Theriot	Dissolved Oxygen and Nutrients	Final	9/30/2008
	120406	Lake de Cade	Dissolved Oxygen and Nutrients	Final	9/30/2008
	120604	Bayou Blue-Intracoastal Waterway to Grand Bayou Canal	Dissolved Oxygen and Nutrients	Final	9/30/2008

Facility TMDL Notification Letters

Beginning in August 2009 LDEQ began sending letters to notify facility representatives of the potential for the TMDL to affect their wastewater discharge permit limits. Notifications for the following TMDLs have been sent:

Table 3.1.5.

Facilities receiving letters of notification of the potential for a TMDL to affect their wastewater discharge permit limits.

Basin	Subsegment	Water Body	Parameter	# of Facilities Notified	TMDL Developed By
Lake Pontchartrain	040201	Bayou Manchac	DO and Nutrients	136	LDEQ
	040303	Lower Amite River	DO and Nutrients	8	
	040903 and 040904	Bayou Cane	DO	4	
Atchafalaya River	010301	West Atchafalaya Basin Floodway	Mercury	15	EPA
	010401	East Atchafalaya Basin and Morganza Floodway	Mercury	6	
	010501	Lower Atchafalaya Basin Floodway	Mercury	33	
	010601	Crow Bayou – Bayou Blue	Chlorine, Sulfates and Total Dissolved Solids	4	
Mississippi River	070203	Devil's Swamp Lake and Bayou Baton Rouge	Lead and Turbidity	12	
	070503	Capitol Lake	Dissolved Oxygen, Total Phosphorus and Total Nitrogen	4	
	070504	Monte Sano Bayou	Chloride	22	
	Total Number of Facilities Notified			**244**	

TMDL Section Attendance at Federal Meetings

Representatives from LDEQ's Water Quality Modeling Section attended the USEPA-Region 6 TMDL Coordinators/303(d) Meeting in 2008 and 2009.

TMDL Section Training

- Two modelers from LDEQ's Water Quality Modeling Section attended the EPA Environmental Fluid Dynamics Code, Water Quality Modeling Workshop in Dallas, Texas in December 2009.
- Water Quality Modeling for Non-Modelers was conducted at LDEQ and taught by LDEQ Water Quality Modeling Section modelers.

Early Warning Organic Compound Detection System

Over 350 industrial and municipal facilities are situated along the Mississippi River within the state of Louisiana. Of these, approximately 175 discharge wastewater into the river under the authority of state and federal permits. These discharges, coupled with the fact that the Mississippi River drains over 40% of the continental U.S., are of great concern to the 1.5 million Louisiana citizens who depend upon the river for their drinking water supply. Because of this concern, the Early Warning Organic Compound Detection System (EWOCDS) was established in 1986. EWOCDS is a cooperative agreement between LDEQ, potable water works, and industries along the river. The main objective of this system is to provide warnings of possible contamination of drinking water supplies to interested parties. Secondarily, it provides data concerning the Mississippi River's water quality and helps serve as a deterrent to the surreptitious discharging or spilling of organic wastes into the Mississippi River. Currently, there are seven locations hosted by seven entities along the lower Mississippi River where ambient river water samples are collected and analyzed for the EWOCDS (see map). Table 3.1.2 lists the 28 compounds analyzed by this program (analytes). From October 2007 through September 2009, 14,582 samples were collected and analyzed for 28 compounds. Of the samples analyzed, 98% had no compounds detected, and 2% had one or more compounds detected. More information on LDEQ's EWOCDS program can be found at: http://www.deq.louisiana.gov/portal/tabid/285/Default.aspx.

Table 3.1.2.

Louisiana's Early Warning Organic Compound Detection System analytes.

EWOCDS Acronym	Compound	CAS Number	Drinking Water MCL (ppb or µg/L)
BDCM	Bromodichloromethane	75-27-4	**
Toluene	Toluene	108-88-3	1000
B-TRI	1,1,2-Trichloroethane	79-00-5	5
PERC	Tetrachloroethene	127-18-4	5
DBCM	Dibromochloromethane	124-48-1	**
CL-Ben	Chlorobenzene	108-90-7	100
Xylene(s)	Dimethylbenzene(s) (m-,o-, and p-Xylenes)	1330-20-7	10,000
PDC	1,2-Dichloropropane	78-87-5	5
BR-3	Bromoform	75-25-2	**
TCE	Trichloroethene	79-01-6	5
M-2	Dichloromethane	75-09-2	5
TV-2	trans-1,2-Dichloroethene	156-60-5	100
CV-2	cis-1,2-Dichloroethene	156-59-2	70
M-3	Chloroform	67-66-3	**
A-TRI	1,1,1-Trichloroethane	71-55-6	200
1,4Ben	1,4-Dichlorobenzene (p-Dichlorobenzene)	106-46-7	75
V-2	1,1-Dichloroethene	75-35-4	7
Benzene	Benzene	71-43-2	5
Styrene	Styrene	100-42-5	100
1,2,4-Ben	1,2,4-Trichlorobenzene	120-82-1	70
EDC	1,2-Dichloroethane	107-06-2	5
ET-Ben	Ethylbenzene	100-41-4	700
M-4	Carbon Tetrachloride	56-23-5	5
VC	Vinyl Chloride	75-01-4	2
1,2Ben	1,2-Dichlorobenzene (o-Dichlorobenzene)	95-50-1	600

- Maximum Contaminant Level – MCL
- Parts per billion – ppb
- This list represents the compounds analyzed by EWOCDS since 1 January 2000.
- Maximum contaminant level values listed above are obtained from the USEPA's Safe Drinking Water web site: http://www.epa.gov/safewater/mcl.html

**These compounds are trihalomethanes and are regulated in drinking water at a maximum combined total of 100 ppb.

Chapter 2: Water Quality Assessment Method and Integrated Report Rationale

Introduction

This summary of Louisiana's water quality assessment methods and Integrated Report (IR) development procedures is taken from the IR Rationale submitted to USEPA in support of Louisiana's 2010 IR. The Rationale was also used for LDEQ's public notice of the draft §305(b) and §303(d) water body assessments.

The IR is developed in order to meet reporting requirements of the Federal Water Pollution Control Act (33 U.S.C. §1313 and 40 CFR Chapter 1 §130.7), commonly known as the Clean Water Act (CWA) (Federal Water Pollution Control Act (FWPCA) 1987). Specifically, assessment results for this IR satisfy requirements of §303(d) and §305(b) of the CWA. Reports under §303(d) and §305(b) must be prepared every even-numbered year. Following current USEPA guidance, these two reports are now combined into one Integrated Report (USEPA 2002; USEPA 2005). This rationale includes descriptions of changes made to Louisiana's IR procedures since the 2008 cycle, along with the reasoning behind those changes.

Changes to the IR for 2010 are based on new ambient water quality data collected from 1 January 2006 through 30 September 2009. In early 2006, all ambient data collected following Hurricanes Katrina and Rita suspected of being impacted by post-hurricane conditions were "flagged" in the database with the codes "HK" or "HR," respectively. Initial 2010 IR assessments were run including this flagged data. If an IR impairment occurred, then the data and assessment were reviewed to determine if the flagged data had a significant effect on the assessment (i.e., extreme outliers from the normal historical range). If it was determined that the hurricane impacted data caused the impairment, then these data points were removed and the assessments were rerun. This affected a limited number of sites monitored at the beginning of the 2006 ambient monitoring cycle. After it was determined that these sites were no longer impacted by post-hurricane conditions, data flagging was discontinued and the data were once again considered acceptable for assessment purposes. Following Hurricane Gustav, which made landfall in September 2008, no ambient monitoring samples were collected at any site until after regional staff determined the water bodies had returned to pre-hurricane condition.

Section 303(d) of the CWA requires the identification, listing, and ranking for development of Total Maximum Daily Loads (TMDLs) waters that do not meet applicable water quality standards after implementation of technology-based controls. Section 305(b) of the CWA requires, among other items, a description of all navigable waters in each state and the extent to which these waters provide for the protection and propagation of fish and wildlife and allow for recreational activities in and on the water (33 U.S.C. §1315(b) et seq.) All assessments were prepared using existing and readily available water quality data and information in order to comply with rules and regulations under §303(d) of the Act (33 U.S.C. §1313 and 40 CFR Chapter 1 §130.7). In most cases, water quality assessments and possible §303(d) listing are based on specific water body subsegments as defined in Louisiana's Environmental Regulatory Code (ERC) 33:IX.1123, table 3 (ERC 2010). Additional data and information were solicited during a 30-day data request public notice period which ended 17 February 2010. As a result of the public request for data, additional water quality data was provided by Lake Pontchartrain Basin Foundation and the Lafayette Parish Bayou Vermilion District. Region 6 of the USEPA provided additional data for the Gulf of Mexico. Border state water quality data was provided by Texas Commission on Environmental Quality, Mississippi Department of Environmental Quality, and the Arkansas Department of Environmental Quality. The Louisiana Department of Health and Hospitals provided *Enterococcus* bacteria data collected as part of its Beach Monitoring Program. All data considered for assessment purposes was required to meet quality assurance/quality control (QA/QC) procedures comparable to LDEQ's Ambient Monitoring Quality Assurance Project Plan (LDEQ 2010). All of this additional data was considered in conjunction with ambient water quality data collected by LDEQ.

The 2010 IR contains new assessments for subsegments in all twelve Louisiana basins: Atchafalaya (01), Barataria (02), Calcasieu (03), Pontchartrain (04), Mermentau (05), Vermilion/Teche (06), Mississippi (07), Ouachita (08), Pearl (09), Red (10), Sabine (11), and Terrebonne (12). Louisiana's ambient water quality monitoring and assessment program follows a four-year rotating subsegment approach through which approximately one-quarter of the state's subsegments are monitored during each one-year period of the rotation. Originally this four-year rotation was based on calendar years, but beginning with the 2007 monitoring cycle (January 2007 – October 2007), LDEQ changed to a "water-year" rotation of 1 October – 30 September. This change permits a full twelve months of water quality data to be collected and placed in a database in sufficient time to generate the Integrated Report by April 1 of even-numbered years.

LDEQ's four-year rotation monitoring program has a number of benefits over Louisiana's previous monitoring programs:

- Water quality data from the same number of water bodies is now collected over a shorter period of time, thus improving LDEQ's ability to identify and target newly developing problems in a timely manner.
- Samples are now collected statewide instead of in two or three basins per year, enabling LDEQ to monitor water quality issues on a broader regional scale.
- Regional staff responsible for collection of samples remain skilled and up-to-date on the latest sampling procedures.
- Regional staffs are able to balance their workloads more evenly instead of having two or three years in which they do little or no ambient water quality sampling and one year of intense field sampling at the expense of all other work.

Table 3.2.1.

Monitoring and assessment schedule for Louisiana's four-year rotating monitoring plan as used for the 2010 Integrated Report.

Ambient Monitoring Cycle	Month/Year of Sampling	Type of Rotation Cycle
1	January 2006 – December 2006	Calendar Year
2	January 2007 – October 2007[1]	Compressed Year
3	October 2007 – September 2008	Water-Year[2]
4	October 2008 – September 2009	Water-Year[2]

1. A limited number of sites for the second ambient monitoring cycle were sampled in October. Most of the sampling ended in September.
2. "Water-Year" refers to a sampling period of October 1 through September 30.

2010 Water Quality Assessment Procedures

General Assessment Procedures

Assessment procedures used for Louisiana's 2010 IR have been developed and updated over a number of years with use in previous §303(d) lists and §305(b) reports. Procedures follow USEPA guidance documents for §305(b) reports and §303(d) lists (USEPA 2005; USEPA 2006); USEPA's Consolidated Assessment and Listing Methodology (CALM) guidance (USEPA 2002); as well as Louisiana's surface water quality standards found at ERC 33:IX.1101-1123. Assessment procedures remain essentially the same as those used for the 2008 IR. Additional details of Louisiana's Integrated Report assessment process can be found in Louisiana's *Standard Operating Procedures for Production of Water Quality Integrated Report. Revision 2.* (LDEQ 2007).

For the 2010 IR assessment, LDEQ field staff collected monthly field analysis and laboratory samples during the ambient monitoring rotations described above. Laboratory samples were sent to LDEQ's water laboratory in Baton Rouge (conventional parameters), one of several Louisiana Department of Health and Hospitals (LDHH) laboratories (fecal coliform bacteria), or contract laboratories (conventionals, fecal coliform bacteria, metals). In order for water quality or other related data to be utilized for the Integrated Report, sample collection, handling, and laboratory analysis must be in accordance with LDEQ's Ambient Water Quality Monitoring Quality Assurance Project Plan developed by LDEQ and approved by USEPA-Region 6 (LDEQ 2010). Data from the LDEQ laboratory as well as field data were entered into LIMS (Laboratory Information Management System) by laboratory staff. After electronic data deliverables from the laboratory were received by the Water Quality Section (WQS), these data were electronically entered into the Oracle-based Louisiana Environmental Assessment Utility (L'EAU) database. This database is maintained on a central LDEQ server by the WQS. Data from LDHH and the contract laboratories were also entered into L'EAU by WQS staff. Field parameters measured using water quality

instrumentation were entered by hand from field data sheets completed by regional LDEQ personnel responsible for ambient water quality sampling. All LDEQ ambient water quality data used for this assessment can be obtained by following directions found on the LDEQ web site at: http://www.deq.louisiana.gov/portal/Default.aspx?tabid=2421. In addition to water quality data collected by LDEQ, additional data and information were solicited from the public and other state and federal agencies. This data is available upon request.

At the beginning of 2010 assessment cycle L'EAU and Statistical Analysis Software (SAS) programs were reviewed and updated as necessary to reflect changes in time frame, criteria, and assessment methods. A series of L'EAU data queries was run and the resulting data transferred to a series of SAS statistical programs. SAS programs are utilized to compare ambient numerical data to criteria for each water body subsegment and designated use. Louisiana water quality standards define eight designated uses for surface waters: primary contact recreation (PCR), secondary contact recreation (SCR), fish and wildlife propagation (FWP) (with "subcategory" of limited aquatic and wildlife use (LAW)), drinking water supply (DWS), oyster propagation (OYS), agriculture (AGR), and outstanding natural resource (ONR). Designated uses and criteria for each water body subsegment are listed in Louisiana's ERC 33:IX.1123. Designated uses have a specific suite of ambient water quality parameters used to assess their support. Links between designated uses and water quality parameters, as well as water quality assessment procedures, can be found in table 3.2.2. Data and information collected from within or immediately downstream of a water body subsegment were used to evaluate each of the subsegment's designated uses, using the decision process shown in table 3.2.2.

"Immediately downstream" typically means within approximately 600 yards or less of the subsegment boundary. There are seven subsegments where the sample site used for the 2010 IR is within this range of the downstream subsegment boundary. In each case there are no known inputs between the boundary and the sample site. Four subsegments have sample points between 1 and 5 miles downstream from the subsegment boundary. In each case there are no reasonable alternatives to sampling at or above the downstream boundary and best professional judgment has determined that the downstream sample point is representative of the assessed subsegment.

Where more than one parameter and criterion define a designated use, support for each use was defined by the designated use's most severely impaired parameter. In rare cases where data from more than one sample station were available for the same subsegment, a case-specific determination was made as to how to use the data; however, in most cases assessments for the sample station with a use impairment were applied to the entire subsegment even if the second sample station did not indicate an impairment.

To illustrate this point, most water bodies have the designated use of FWP. Fish and wildlife propagation is assessed as noted in table 3.2.2, using criteria for the ambient sampling parameters dissolved oxygen, pH, temperature, chloride, sulfate, and TDS, as well as several metals and organic compounds. In the case of subsegment LA030104_00, Mill Creek, only the FWP criterion for dissolved oxygen was not met based on requirements of table 3.2.2. Therefore, only dissolved oxygen was reported as an impairment to FWP in the 2010 IR. Had turbidity or some other parameter also shown impairment, that impairment would have been listed as well.

Numerical data from LDEQ's ambient water quality monitoring network collected between 1 January 2006 and 30 September 2009 were compiled for each assessment. Under Louisiana's four-year rotating subsegment monitoring approach, this provided twelve monthly samples for most water body subsegments. Up to four years (48 samples) of data were available for those subsegments with long-term trend monitoring sites. Ambient data used for analysis depended on the designated use(s) for each water body and the availability of numerical water quality criteria. For most parameters and criteria, at least five samples were required for the assessment to be considered valid. Parameters collected quarterly (metals and organics) required a minimum of three samples. For metals assessments, if a *preliminary* determination of impairment based on routine ambient sampling was made, this was then followed up with an additional round of five "ultra-clean" metals samples, using special sample collection and laboratory analysis methods to determine *final* impairment for IR purposes. These special methods are designed to significantly reduce the possibility of sample contamination during collection and laboratory analysis.

Table 3.2.2.

Decision process for evaluating use support, showing measured parameters for each designated use; Louisiana's *2010 Integrated Report*[1]

Designated Use	Measured Parameter	Support Classification for Measured Parameter		
		Fully Supporting	Partially Supporting[3]	Not Supporting
Primary Contact Recreation (PCR) (Designated swimming months of May-October, only)	Fecal coliform[2]	0-25% do not meet criteria	-	>25% do not meet criteria
	Temperature	0-30% do not meet criteria	>30-75% do not meet criteria	>75% do not meet criteria
	Metals[5,6] and Toxics	<2 exceedances of chronic or acute criteria in most recent consecutive 3-year period, or 1-year period for newly tested waters	-	≥2 exceedances of chronic or acute criteria in most recent consecutive 3-year period, or 1-year period for newly tested waters
Secondary Contact Recreation (SCR) (All months)	Fecal coliform[2]	0-25% do not meet criteria	-	>25 % do not meet criteria
	Metals[5,6] and Toxics	<2 exceedances of chronic or acute criteria in most recent consecutive 3-year period, or 1-year period for newly tested waters	-	≥2 exceedances of chronic or acute criteria in most recent consecutive 3-year period, or 1-year period for newly tested waters
Fish and Wildlife Propagation (FWP)	Dissolved oxygen (routine ambient monitoring data)[4]	0-10% do not meet criteria	>10-25% do not meet criteria	>25% do not meet criteria
	Dissolved oxygen (follow-up continuous monitoring data)[4]	Footnote 4.	Footnote 4.	Footnote 4.
	Temperature, pH, chloride, sulfate, TDS, turbidity	0-30% do not meet criteria	>30-75% do not meet criteria	>75% do not meet criteria
	Metals[5,6] and Toxics	<2 exceedances of chronic or acute criteria in most recent consecutive 3-year period,[5,6] or 1-year period for newly tested waters	-	≥2 exceedances of chronic or acute criteria in most recent consecutive 3-year period,[5,6] or 1-year period for newly tested waters

Table 3.2.2.

Decision process for evaluating use support, showing measured parameters for each designated use; Louisiana's *2010 Integrated Report*[1]

Designated Use	Measured Parameter	Support Classification for Measured Parameter		
		Fully Supporting	**Partially Supporting[3]**	**Not Supporting**
Drinking Water Source (DWS)	Color	0-30% do not meet criteria	>30-75% do not meet criteria	>75% do not meet criteria
	Fecal coliform[2]	0-30% do not meet criteria	-	>30 % do not meet criteria
	Metals[5,6] and Toxics	< 2 exceedances of drinking water criteria in most recent consecutive 3-year period,[5,6] or 1-year period for newly tested waters	-	≥2 exceedances of drinking water criteria in the most recent consecutive 3-year period,[5,6] or 1-year period for newly tested waters
Outstanding Natural Resource (ONR)	Turbidity	0-10% do not meet criteria	>10-25% do not meet criteria	>25% do not meet criteria
Agriculture (AGR)	None	-	-	-
Oyster Propagation (OYS)	Fecal coliform[2]	Median fecal coliform ≤ 14 MPN/100 mL; and ≤ 10% of samples > 43 MPN/100 mL	-	Median fecal coliform > 14 MPN/100 mL; and > 10% of samples > 43 MPN/100 mL
Limited Aquatic and Wildlife (LAW)	Dissolved oxygen[4]	0-10% do not meet criteria	>10-25% do not meet criteria	>25% do not meet criteria

Table 3.2.2.

Decision process for evaluating use support, showing measured parameters for each designated use; Louisiana's *2010 Integrated Report*[1]

Designated Use	Measured Parameter	Support Classification for Measured Parameter Fully Supporting Partially Supporting[3] Not Supporting
1. Where deviations from the decision process described in table 3.2.2 occur, detailed information will be given to account for and justify those deviations. For instance, circumstances that may not be accounted for in the plain electronic analysis of the data will be explored and may be used to either not list the water body or to put the WIC (Water body impairment combination) into a different category. Those circumstances will be fully articulated. 2. For most water bodies, criteria are as follows: PCR, 400 colonies/100 mL; SCR, 2,000 colonies/100 mL; DWS, 2,000 colonies/100 mL; SFP, 43 colonies/100 mL (see ERC 33:IX.1123). 3. While the assessment category of "Partially Supporting" is included in the SAS statistical assessment programming, any use support failures were recorded in ADB as "Not Supporting." This procedure was first adopted for the 2002 §305(b) cycle because "partially supported" uses receive the same TMDL treatment as "not supported" uses. 4. In the event that analysis of routine ambient monitoring data for dissolved oxygen results in partial- or non-support, continuous monitoring (CM) data, where available, was used for follow-up assessment. CM data runs were approximately 48-72 hours in duration. CM data was evaluated as follows: All of the 15-minute interval dissolved oxygen observations from a CM sample run were analyzed to determine if more than 10% of the data points were below minimum criteria. Water bodies that fell below the criteria greater than 10% of the time were reported as IRC 5 (see table 3.2.3) and, therefore, are on the §303(d) list. Water bodies that fell below the criteria less than or equal to 10% of the time were placed in IRC 1, fully supported. If ambient monitoring indicated impairment and CM data was not available for analysis, the water body was placed in IRC 5 until such time as CM data can be collected during the critical season of May 1 through October 31. 5. Determination of the application of marine or freshwater metals criteria was made based on ERC 33:IX.1113.A.C.6.d. 6. Parameters collected quarterly (metals and organics) required a minimum of three samples. For metals assessments only a *preliminary* determination of impairment based on routine ambient sampling was made. If preliminary results indicated possible impairment, this was then followed up with an additional round of five "ultra-clean" metals samples using special sample collection and laboratory analysis methods to determine *final* impairment for IR purposes. These special methods are designed to significantly reduce the possibility of sample contamination during collection and laboratory analysis. As with ambient sampling if two or more of the "ultra-clean" samples exceeded criteria, then the subsegment was considered a *final* impairment for Integrated Report purposes.		

Determination of Suspected Sources of Impairment

In addition to the use of numerical data, LDEQ regional staff members were asked for input regarding significant suspected sources of impairment or whether impairment was due solely to natural sources. It was anticipated that numerical data alone might suggest impairment for some Louisiana water bodies when in fact there was no impairment, or the impairment was due exclusively to natural causes. Regional staff familiar with the water body area are best capable of suggesting one or more suspected sources for a water body's impairment. Using the best professional judgment of regional staff provides valuable input regarding the quality of individual water bodies.

If an impairment was strongly suspected by regional staff to have been caused by natural conditions (not man-altered or man-induced) then the preliminary IRC was changed from 5 to 5RC. In such cases a Use Attainability Analysis (UAA) or other water quality survey may be required. This will be determined upon further investigation by LDEQ.

In cases where there is uncertainty about the suspected cause but no anthropogenic sources are strongly suspected, then IRC 3 was used. IRC 3 was also used for cases where nitrate/nitrite nitrogen and/or total phosphorus were reported as a suspected cause of impairment. This was due to the fact that Louisiana does not currently have nutrient criteria; therefore, it is impossible to know if nutrients are in fact causing impairment. These listings for

nitrate/nitrite nitrogen and total phosphorus are a legacy of what were known as "evaluative assessments." Evaluative assessments were best professional judgments by regional staff made without the benefit of nutrient criteria with which to make that judgment. This assessment practice was discontinued after the 1998 §305(b) report. Use of both IRC 5RC and IRC 3 allows for additional investigation into the possible sources of impairment as well as a determination of the need for a UAA.

Integrated Report Category Determination

Following statistical determination of a water body's designated use support and what chemical parameter(s) in that water body may be impaired, a preliminary determination was made as to which Integrated Report Category (IRC) the suspected water body impairment combination (WIC) should be placed in. In most cases this was IRC 5 (the 303(d) list). A WIC is simply one impairment affecting one water body subsegment, for example, a lead impairment for subsegment LAXXXXXX-00. Water bodies may have multiple WICs affecting one or more designated uses. USEPA guidance permits the placement of suspected WICs into one of eight IR categories. Integrated Report Categories, to which these WICs may be assigned, are described in table 3.2.3.

Table 3.2.3

Environmental Protection Agency Integrated Report categories used to categorize water body/pollutant combinations for Louisiana's 2010 Integrated Report

IR Category (IRC)	IR Category Description
IRC 1	Specific Water body Impairment Combination (WIC) cited on a *previous* §303(d) list is now attaining all uses and standards.
IRC 2	Water body is meeting *some* uses and standards but there is insufficient data to determine if uses and standards *associated with the specific WIC* cited are being attained.
IRC 3	There is insufficient data to determine if uses and standards *associated with the specific WIC* cited are being attained.
IRC 4a	WIC exists but a TMDL has been completed for the *specific WIC* cited.
IRC 4b	WIC exists but control measures other than a TMDL are expected to result in attainment of designated uses *associated with the specific WIC* cited.
IRC 4c	WIC exists but a pollutant (man-altered or man-induced impairment) does not cause the *specific WIC* cited.
IRC 5	WIC exists for one or more uses, and a TMDL is required for the *specific W*IC cited. IRC 5 represents Louisiana's §303(d) list.
IRC 5RC (Revise Criteria)	WIC exists for one or more uses, and a TMDL is required for the specific WIC cited; however, LDEQ will investigate revising criteria due to the possibility that natural conditions may be the source of the water quality criteria impairments.

Determination of TMDL Prioritization

As part of §303(d) listing requirements states are required to prioritize for TMDL development all water bodies classified as IRC 5 or IRC 5RC. For the 2010 IR, prioritization was based on the following matrix:

- Atchafalaya Basin (01): All impairments still subject to the Consent Decree schedule. TMDL due date is 2009, priority is High. (USEPA "backstop" due date allows for extended period.)
- Pontchartrain Basin (04): All impairments still subject to the Consent Decree schedule. TMDL due date is 2012, priority is High. (Due date was extended from 2011 to 2012 by agreement with USEPA, Region 6.)
- Pontchartrain Basin (04): Dissolved oxygen impairment for New River (LA040404_00). TMDL due date is TBD (To Be Determined), priority is Medium. Impairment is not on the Consent Decree but survey and TMDL work are in progress, hence the higher priority.

- Calcasieu Basin (03) and Vermilion/Teche Basin (06): All impairments first identified after the Consent Decree was put in place. TMDL due date is TBD, priority is Medium. (Medium priority based on expected permit needs in near future.)
- For those impairments first identified after the Consent Decree was put in place the TMDL due date is TBD and the priority is Low.
- For those impairments first identified after the Consent Decree but classified as IRC 5RC the TMDL due date is set at 13 years from first listing (i.e., 2021 for IR impairments first identified in 2008 and 2023 for IR impairments first identified in 2010). The priority for these impairments is Low.
- For those *Enterococcus* impairments based on Louisiana Department of Health and Hospitals' Beach Monitoring Program the TMDL due date is TBD and the priority is Low. Low priority is based on uncertainty over efficacy of the indicator species for this LDHH program and the lack of Louisiana criteria for *Enterococcus*.

2010 §303(d) List Development and Other IR Categorizations

The 2010 §303(d) list represents a compilation of four different sources of information:

- The 2008 Integrated Report;
- New data assessments for all twelve Louisiana basins assessed in 2010;
- All recent TMDL activities occurring during or after development of the 2008 §303(d) list; and
- All water bodies under new or existing fish consumption or swimming advisories.

In addition to drawing from these various sources and assigning IRCs to the suspected causes of impairment, USEPA's current guidance on IR development was used to determine what water bodies were formally included on Louisiana's 2010 §303(d) list (IRC 5 and 5RC). Using USEPA's IR guidance, all suspected WICs identified in the 2010 IR were assigned to one of eight categories (table 3.2.3).

It is important to note that removal of a water body from the §303(d) list, for any reason, does not remove water quality protections from that water body. All water bodies in Louisiana, listed or not listed, are subject to the same protections under the CWA and Louisiana's Environmental Quality Act (LEQA) (LEQA 1995). Permitted facilities are still subject to conditions of their permits. Unpermitted point source dischargers are still required to obtain a permit or face enforcement actions. Violators of permit conditions are still subject to enforcement action. And contributors to nonpoint sources of pollution are still encouraged to follow best management practices as developed by LDEQ's Nonpoint Source Program and its many collaborators. Dischargers to water bodies removed from the §303(d) list because TMDLs have been developed are still required to meet permit limits based on the TMDL that was developed for that water body.

USEPA's IR guidance was used to categorize specific suspected WICs in order to narrow the focus on which impairments require development of a TMDL for each assessed water body subsegment. If necessary, suspected WICs placed in IRC 3, 4b, and 5RC will be addressed with additional monitoring to determine if use impairment is occurring, or if the suspected impairment can be addressed by corrective actions other than development of a TMDL. In some cases, usually for small water bodies with fish consumption or swimming advisories lying within a larger regulatory subsegment, the smaller "advisory" water body was also named in the 2010 IR. Impairments of this nature are water body-specific issues not directly related to the overall subsegment. These smaller water bodies are not named as a regulatory subsegment and, therefore, were not assessed for any uses other than the specific advisory in question. Nor were these advisory water bodies included in summary tables and charts for the Integrated Report. They were, however, included in the full IR assessment spreadsheet generated from the ADB. This limitation was done in order to standardize the IR summary tables for only those subsegments defined in Louisiana's Environmental Regulatory Code (ERC 33:IX.1123. Table 3).

Use of IRC 2-4c by Louisiana does not imply that a water body subsegment placed in these categories for one or more specific WICs was, thereby, excluded from IRC 5 or 5RC (the §303(d) list) for any other applicable WIC(s). To the contrary, a water body subsegment with one or more WICs assigned to IRC 5 or 5RC is by USEPA guidance on the §303(d) list even if other WICs for the subsegment were assigned to IRC 2-4c. However, these water bodies are only on the §303(d) list for those WICs specifically assigned by Louisiana to IRC 5 or 5RC. IR Categories 2-4c were used by Louisiana in its Integrated Report as a means to classify and account for WICs found on USEPA's

Consent Decree §303(d) list. These categories were also used to account for newly identified impairments, not assigned to IRC 5, that are caused by natural sources or for which control activities other than TMDLs are in place.

Data Management of Assessment Results

All resulting assessment information, including water body name, size, type, designated uses, use support, suspected causes, and suspected sources of impairment, was entered into a database developed for the USEPA by RTI. (Formerly known as Research Triangle Institute, RTI is a USEPA contractor for computer technology.) States are encouraged by USEPA to use this Assessment Database (ADB) in order to provide more consistent reporting at a national level. LDEQ has been using ADB since 2002. For 2010, the IRC for each WIC was included in the "User Defined Category" field of the "Cause" data entry screen. Additional information regarding each water body, including TMDL due date, TMDL status, monitoring information, and federal Hydrologic Unit Code (HUC), was also input to ADB in order to facilitate easier monitoring, assessment, and TMDL tracking. Because use of the ADB system is limited to state and federal computers on which the program has been downloaded, LDEQ generates an Excel spreadsheet for public presentation of all assessment results for the state. It is this spreadsheet, in Excel or PDF form, which represents LDEQ's 2010 Integrated Report assessments.

Section 303(d) List Public Notice Procedures

Section 303(d) of the CWA requires states to submit their §303(d) lists to public notice for comments. This public comment period was begun on 8 July 2010 and completed on 20 September 2010. This comment period included the standard 30-days, plus an extension requested by Gulf Restoration Network. All comments received were compiled and addressed by LDEQ. LDEQ's responses to comments can be found in Appendix G of this report.

Chapter 3: River and Stream Water Quality Assessment

Summary of River and Stream Water Quality Assessments

The figures reported in table 3.3.1 are based upon the level of use support for all applicable designated uses, as determined through monitored assessments. The miles of impaired water bodies identified as being affected by various suspected causes of impairment are shown in table 3.3.2. The miles affected by various suspected sources of impairment are shown in table 3.3.3. Tables 3.3.2 and 3.3.3 refer only to those water bodies that were assessed as not supporting designated uses. The tables are not ranked by order of impact. Assessment results for all water body subsegments, as defined in ERC 33:IX.1123, table 3, can be found in Appendices A, B, and C.

Table 3.3.1.

Summary of designated use support for Louisiana rivers and streams, *2010 Integrated Report* assessment. (Reported in miles (water body count).)

Designated Use	Size Fully Supported		Size Not Supported		Insufficient Data		Not Assessed		Total Size for Designated Uses	
Primary Contact Recreation	7,649	(260)	1,480	(66)	22	(1)	42	(6)	9,193	(333)
Secondary Contact Recreation	9,125	(326)	180	(12)			52	(7)	9,357	(345)
Fish and Wildlife Propagation	2,929	(99)	6,297	(236)			41	(4)	9,267	(339)
Drinking Water Supply	1,060	(19)	416	(10)			12	(1)	1,488	(30)
Outstanding Natural Resource Waters	1,016	(35)	564	(24)			7	(2)	1,587	(61)
Oyster Propagation	179	(12)	291	(17)					470	(29)
Agriculture	2,034	(59)					10	(1)	2,044	(60)
Limited Aquatic Life and Wildlife Use	19	(2)	71	(4)					90	(6)

Suspected Causes of Non-Support of Designated Uses

Table 3.3.2.

Total sizes of Louisiana rivers and streams not fully supporting designated uses due to various suspected causes of impairment, *2010 Integrated Report* assessment. (reported in miles and water body count)

Suspected Cause of Impairment	Size	Count
1,1,1,2-Tetrachloroethane	12	1
1,2-Dichloroethane	8	1
Atrazine	43	1
Benzo(a)pyrene (PAHs)	13	2
Bromoform	12	1
Carbofuran	930	23
Chloride	513	31
Chlorine	6	1
Color	416	10
DDT	749	6

Table 3.3.2.

Total sizes of Louisiana rivers and streams not fully supporting designated uses due to various suspected causes of impairment, *2010 Integrated Report* assessment. (reported in miles and water body count)

Suspected Cause of Impairment	Size	Count
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	70	2
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) (only)	70	2
Fecal Coliform	1,761	81
Fipronil	252	6
Hexachlorobenzene	12	1
Hexachlorobutadiene	12	1
Lead	417	17
Mercury in Fish Tissue	2,395	73
Methoxychlor	8	1
Methyl Parathion	43	1
Nitrate/Nitrite (Nitrite + Nitrate as N)	1,275	48
Non-Native Aquatic Plants	493	26
Oil and Grease	4	1
Oxygen, Dissolved	4,469	158
pH, High	11	2
pH, Low	340	14
Phenols	8	1
Phosphorus (Total)	1,211	46
Polychlorinated Biphenyls	41	3
Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)	29	2
Sedimentation/Siltation	1,104	30
Sulfates	597	36
Temperature, water	27	2
Total Dissolved Solids	1,246	61
Total Suspended Solids (TSS)	1,767	44
Toxaphene	420	2
Turbidity	2,336	66

Suspected Sources of Non-Support of Designated Uses

Table 3.3.3.

Total sizes of Louisiana rivers and streams not fully supporting designated uses due to various suspected sources of impairment, *2010 Integrated Report* assessment. (reported in miles and water body count)

Suspected Sources of Impairment	Size	Count
Agriculture	621	18
Atmospheric Deposition - Toxics	2,395	73
CERCLA NPL (Superfund) Sites	13	2
Changes in Tidal Circulation/Flushing	171	11
Combined Sewer Overflows	39	2
Contaminated Sediments	13	2
Crop Production (Crop Land or Dry Land)	550	4

Table 3.3.3.

Total sizes of Louisiana rivers and streams not fully supporting designated uses due to various suspected sources of impairment, *2010 Integrated Report* assessment. (reported in miles and water body count)

Suspected Sources of Impairment	Size	Count
Dairies (Outside Milk Parlor Areas)	10	1
Discharges from Municipal Separate Storm Sewer Systems (MS4)	86	6
Drainage/Filling/Loss of Wetlands	319	17
Dredging (e.g., for Navigation Channels)	40	1
Drought-related Impacts	299	16
Flow Alterations from Water Diversions	164	7
Forced Drainage Pumping	71	6
Habitat Modification - other than Hydromodification	115	9
Impacts from Hydrostructure Flow Regulation/modification	120	6
Industrial Point Source Discharge	146	8
Industrial/Commercial Site Stormwater Discharge (Permitted)	4	1
Introduction of Non-native Organisms (Accidental or Intentional)	505	27
Irrigated Crop Production	1,913	47
Littoral/shore Area Modifications (Non-riverine)	115	9
Managed Pasture Grazing	245	10
Marina/Boating Sanitary On-vessel Discharges	107	8
Mine Tailings	30	1
Municipal (Urbanized High Density Area)	156	6
Municipal Point Source Discharges	479	24
Natural Conditions - Water Quality Standards Use Attainability Analyses Needed	1,610	64
Natural Sources	1,287	52
Naturally Occurring Organic Acids	347	15
Non-irrigated Crop Production	1,658	45
Nonpoint Source	12	1
Onsite Treatment Systems (Septic Systems and Similar Decentralized Systems)	1,196	57
Other Spill-Related Impacts	22	1
Package Plant or Other Permitted Small Flows Discharges	413	25
Petroleum/natural Gas Activities	122	6
Rangeland Grazing	96	2
Residential Districts	86	3
Runoff from Forest/Grassland/Parkland	85	1
Rural (Residential Areas)	75	4
Sanitary Sewer Overflows (Collection System Failures)	298	15
Seafood Processing Operations	19	2
Sediment Resuspension (Clean Sediment)	150	9
Sewage Discharges in Unsewered Areas	307	13
Silviculture Activities	243	6
Silviculture Harvesting	143	5
Silviculture Plantation Management	140	4
Site Clearance (Land Development or Redevelopment)	225	15
Source Unknown	3,715	136

Table 3.3.3.

Total sizes of Louisiana rivers and streams not fully supporting designated uses due to various suspected sources of impairment, *2010 Integrated Report* assessment. (reported in miles and water body count)

Suspected Sources of Impairment	Size	Count
Sources Outside State Jurisdiction or Borders	194	6
Streambank Modifications/destabilization	10	1
Total Retention Domestic Sewage Lagoons	86	8
Unpermitted Discharge (Domestic Wastes)	238	11
Unspecified Domestic Waste	16	2
Unspecified Urban Stormwater	8	1
Upstream Source	29	2
Urban Runoff/Storm Sewers	21	3
Waterfowl	27	1
Wildlife Other than Waterfowl	425	22

Chapter 4: Lake Water Quality Assessment

Summary of Lake Water Quality Assessments

The figures reported in table 3.4.1 are based upon the level of use support for all applicable designated uses, as determined through monitored assessments. The acres of impaired water bodies identified as being affected by various suspected causes of impairment are shown in table 3.4.2. The acres affected by various suspected sources of impairment are shown in table 3.4.3. Tables 3.4.2 and 3.4.3 refer only to those water bodies that were assessed as not supporting designated uses. The tables are not ranked by order of impact. Assessment results for all water body subsegments, as defined in ERC 33:IX.1123, table 3, can be found in Appendices A, B, and C.

Table 3.4.1.

Summary of designated use support for Louisiana lakes, *2010 Integrated Report* assessment. (Reported in acres (water body count).)

Designated Use	Size Fully Supported		Size Not Supported		Not Assessed		Total Size for Designated Use	
Primary Contact Recreation	650,756	(57)	5,132	(4)	2,322	(4)	658,210	(65)
Secondary Contact Recreation	646,640	(60)	9,248	(1)	2,322	(4)	658,210	(65)
Fish and Wildlife Propagation	39,458	(11)	616,430	(50)	2,322	(4)	658,210	(65)
Drinking Water Supply	261,936	(10)	2,690	(1)	38	(1)	264,664	(12)
Agriculture	425,672	(15)	--	--	326	(1)	425,998	(16)

Suspected Causes of Non-Support of Designated Uses

Table 3.4.2.

Total sizes of Louisiana lakes not fully supporting designated uses due to various suspected causes of impairment, *2010 Integrated Report* assessment. (Reported in acres and water body count.)

Suspected Cause of Impairment	Size	Count
Arsenic	24	1
Carbofuran	83,840	1
Chloride	51,840	1
Color	2,690	1
Fecal Coliform	14,356	4
Hexachlorobenzene	24	1
Hexachlorobutadiene	24	1
Lead	24	1
Mercury in Fish Tissue	318,481	20
Nitrate/Nitrite (Nitrite + Nitrate as N)	12,899	7
Non-Native Aquatic Plants	319,163	16
Oil and Grease	24	1
Oxygen, Dissolved	89,605	26
pH, High	30,630	4
pH, Low	10,623	3

Table 3.4.2.

Total sizes of Louisiana lakes not fully supporting designated uses due to various suspected causes of impairment, *2010 Integrated Report* assessment. (Reported in acres and water body count.)

Suspected Cause of Impairment	Size	Count
Phosphorus (Total)	12,899	7
Polychlorinated Biphenyls	2,260	3
Sedimentation/Siltation	153,472	4
Sulfates	69,199	5
Total Dissolved Solids	56,638	4
Total Suspended Solids (TSS)	154,717	6
Turbidity	269,749	18

Suspected Sources of Non-Support of Designated Uses

Table 3.4.3.

Total sizes of Louisiana lakes not fully supporting designated uses due to various suspected sources of impairment, *2010 Integrated Report* assessment. (reported in acres and water body count)

Suspected Source of Impairment	Size	Count
Agriculture	33,348	8
Atmospheric Deposition - Toxics	318,457	19
Contaminated Sediments	24	1
Discharges from Municipal Separate Storm Sewer Systems (MS4)	60	1
Impacts from Hydrostructure Flow Regulation/modification	2,682	2
Industrial Point Source Discharge	2,200	2
Industrial/Commercial Site Stormwater Discharge (Permitted)	84	2
Internal Nutrient Recycling	1,594	1
Introduction of Non-native Organisms (Accidental or Intentional)	319,163	16
Irrigated Crop Production	84,048	2
Lake Fertilization	10,272	3
Natural Conditions - Water Quality Standards Use Attainability Analyses Needed	127,049	17
Natural Sources	73,225	7
Naturally Occurring Organic Acids	24,703	4
Non-irrigated Crop Production	101,460	3
Onsite Treatment Systems (Septic Systems and Similar Decentralized Systems)	7,104	1
Other Spill-Related Impacts	2,598	1
Package Plant or Other Permitted Small Flows Discharges	9,248	1
Runoff from Forest/Grassland/Parkland	7,104	1
Rural (Residential Areas)	5,418	3
Sanitary Sewer Overflows (Collection System Failures)	9,248	1
Sediment Resuspension (Clean Sediment)	66,778	4
Sewage Discharges in Unsewered Areas	8,971	4
Silviculture Activities	1,747	1
Silviculture Plantation Management	1,747	1
Site Clearance (Land Development or Redevelopment)	10,995	2

Table 3.4.3.

Total sizes of Louisiana lakes not fully supporting designated uses due to various suspected sources of impairment, *2010 Integrated Report* assessment. (reported in acres and water body count)

Suspected Source of Impairment	Size	Count
Source Unknown	357,260	28
Streambank Modifications/destabilization	1,747	1
Unspecified Land Disturbance	2,598	1
Upstream Source	24	1
Urban Runoff/Storm Sewers	24	1
Waterfowl	10,842	2

Chapter 5: Estuary and Coastal Water Quality Assessment

Summary of Estuary and Coastal Water Quality Assessments

The figures reported in table 3.5.1 are based upon the level of use support for all applicable designated uses, as determined through monitored assessments. The square miles of impaired water bodies identified as being affected by various suspected causes of impairment are shown in table 3.5.2. The square miles affected by various suspected sources of impairment are shown in table 3.5.3. Tables 3.5.2 and 3.5.3 refer only to those water bodies that were assessed as not supporting designated uses. The tables are not ranked by order of impact. Assessment results for all water body subsegments, as defined in ERC 33:IX.1123, table 3, can be found in Appendices A, B, and C.

Table 3.5.1.

Summary of designated use support for Louisiana estuaries, *2010 Integrated Report* assessment. (Reported in square miles (water body count).)

Designated Use	Size Fully Supported		Size Not Supported		Total Size for Designated Use	
Primary Contact Recreation	4,954	(52)	--	--	4,954	(52)
Secondary Contact Recreation	4,954	(52)	--	--	4,954	(52)
Fish and Wildlife Propagation	3,171	(37)	1,783	(15)	4,954	(52)
Oyster Propagation	2,513	(30)	1,755	(10)	4,268	(40)

Suspected Causes of Non-Support of Designated Uses

Table 3.5.2.

Total sizes of Louisiana estuaries not fully supporting designated uses due to various suspected causes of impairment, *2010 Integrated Report* assessment. (reported in square miles and water body count)

Suspected Cause of Impairment	Size	Count
Carbofuran	187	1
Lead	6	1
Non-Native Aquatic Plants	91	1
Sedimentation/Siltation	187	1
Total Suspended Solids (TSS)	187	1
Nitrate/Nitrite (Nitrite + Nitrate as N)	193	2
Phosphorus (Total)	193	2
Turbidity	214	4
Oxygen, Dissolved	858	6
Mercury in Fish Tissue	1,657	9
Fecal Coliform	1,755	10

Suspected Sources of Non-Support of Designated Uses

Table 3.5.3.

Total sizes of Louisiana estuaries not fully supporting designated uses due to various suspected sources of impairment, *2010 Integrated Report* assessment. (reported in square miles and water body count)

Suspected Sources of Impairment	Size	Count
Atmospheric Deposition - Toxics	1,657	9
Discharges from Municipal Separate Storm Sewer Systems (MS4)	2	1
Introduction of Non-native Organisms (Accidental or Intentional)	91	1
Irrigated Crop Production	193	2
Marina/Boating Sanitary On-vessel Discharges	766	5
Natural Sources	608	6
Non-irrigated Crop Production	193	2
On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)	399	3
Package Plant or Other Permitted Small Flows Discharges	581	3
Petroleum/natural Gas Activities	710	3
Petroleum/natural Gas Production Activities (Permitted)	581	3
Sanitary Sewer Overflows (Collection System Failures)	2	1
Sediment Resuspension (Clean Sediment)	27	3
Source Unknown	1,688	12
Upstream Source	663	3
Waterfowl	510	2
Wildlife Other than Waterfowl	56	2

Gulf of Mexico Hypoxic Zone Assessments

At the time of development of the 2010 IR, limited additional data was available beyond that which was used for the 2008 IR assessment of the Gulf hypoxic zone. Therefore, the same 2008 IR assessments were used for the 2010 IR. Following is the discussion of the Gulf assessment process from the 2008 IR text.

LDEQ has long acknowledged that hypoxic conditions exist during certain periods of the year in offshore waters of the Gulf of Mexico outside the state three-mile limit. LDEQ also recognizes that elevated nutrient levels associated with spring and summer runoff from the Mississippi Basin are a contributing factor in development of the hypoxic zone. In recognition of this, LDEQ has participated in the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force and development of the Gulf Hypoxia Action Plan 2008 (GHAP 2008), as well as its predecessor documents. The GHAP was also signed by the U.S. Environmental Protection Agency (USEPA) and numerous other federal and state agencies with an interest in reducing the hypoxic zone and its effects on the gulf. LDEQ has been and remains a member agency of other national workgroups and task forces including the Gulf of Mexico Alliance charged with addressing the hypoxic zone. For more information on USEPA and state efforts to reduce hypoxia in the Gulf of Mexico and to obtain copies of the GHAP go to: http://www.epa.gov/msbasin/index.htm. The question remains, however, whether the hypoxic zone affects waters within the State's three-mile limit, thus representing an impairment to coastal subsegments subject to state 305(b) and 303(d) reporting requirements.

During the 2008 IR development process, LDEQ received additional data from USEPA on the Gulf of Mexico hypoxic zone. Based on these additional datasets, LDEQ has determined that the coastal subsegments of: 021102 – Barataria Basin Coastal Bays and Gulf Waters to the State Three-Mile Limit; 070601 – Mississippi Basin Coastal Bays and Gulf Waters to the State Three-Mile Limit; and 120806 – Terrebonne Basin Coastal Bays and Gulf Waters to the State Three-Mile Limit are suspected of impairment due to low dissolved oxygen (DO) at or near the bottom of the water column. This suspected impairment is believed to exist primarily during summer months, but the

limited temporal nature of the data precludes adequate analysis outside the summer sampling period. The suspected source of impairment has been reported as "upstream sources."

LDEQ has also determined that these suspected DO impairments will be placed in IR Category 4b. Category 4b is used for impairments caused by a pollutant that is being addressed by the state through other pollution control requirements. Other pollution control requirements were defined by USEPA guidance as including best management practices (BMP). The GHAP consists of a series of recommended best management practices as well as research to develop improved BMPs in the future. LDEQ currently uses IR Category 4b for impairments due to noxious aquatic plants using the Louisiana Aquatic Invasive Species Council as a TMDL alternative program. In addition, LDEQ uses IR Category 4b for several legacy pollution issues being addressed by remediation activities either completed or in progress.

In order to supplement LDEQ's existing ambient water quality data, LDEQ was able to obtain raw data for the Gulf of Mexico nearshore waters from USEPA-Region 6. After detailed review it was determined that this data was specific to sample sites within the state three-mile limit. It consisted of raw data in Excel format collected by the Louisiana Universities Marine Consortium (LUMCON), USEPA Gulf Breeze Laboratory in Florida, and the Gulf States Marine Fisheries Program-SeaMap sampling efforts. Additional data was also obtained from the Louisiana Department of Wildlife and Fisheries (LDWF). All data analyzed was collected between 2004 and 2008 in keeping with LDEQ's procedures for the 2008 IR. Because this data was collected as part of state or federal research projects, it was assumed that proper quality control procedures were followed per existing grant commitments or peer review publication requirements. The LUMCON and Gulf Breeze dissolved oxygen (DO) concentrations were measured at multiple depths through the water column at each site/date sampled. LDWF DO concentrations were measured at the surface and at trawl depth which was near the bottom in the trawl area. Trawl depths for LDWF were 10, 20, and 30 feet. SeaMap DO was measured on or near the bottom.

LDEQ's routine ambient surface water sampling and assessment procedures were the basis for the original 2008 IR assessment of full support of the DO criterion for all coastal subsegments. The DO criterion for all offshore coastal subsegments is 5.0 mg/L. These routine ambient samples are collected at 1 meter or half the distance to the bottom if the depth is less than 1 meter. LDEQ does not currently have a sampling or assessment procedure for considering data collected at multiple depths through the water column. In addition, LDEQ's existing DO criteria are assumed to represent surface water conditions for which the criteria were developed, although this assumption is not specified in the applicable regulation (LAC 33:IX.1113.C.3). It is well known that deep bodies of water such as lakes, large rivers and the Gulf of Mexico will have naturally lower DO concentrations at or near the bottom due to thermal or saline stratification and reduced or absent mixing with well aerated surface waters. These factors make it difficult to accurately assess for hypoxic conditions based on water column profile data. LDEQ's routine ambient sampling and assessment protocol indicated full support for the state nearshore Gulf waters.

The additional data provided by USEPA, LDWF and SeaMap represented the three coastal subsegments of:

- 021102 – Barataria Basin Coastal Bays and Gulf Waters to the State Three-Mile Limit;
- 070601 – Mississippi Basin Coastal Bays and Gulf Waters to the State Three-Mile Limit; and
- 120806 – Terrebonne Basin Coastal Bays and Gulf Waters to the State Three-Mile Limit.

LUMCON and Gulf Breeze data was analyzed as "site/dates." A site/date consists of multiple DO readings taken through the water column from near the surface to near the bottom at a particular site and date. Analyzing these two additional data sets indicated that surface water (approximate depth of 1 meter) DO concentrations fully supported the DO criterion based on LDEQ's standard assessment protocol for DO. This initial review only considered surface water data, not the data collected throughout the water column.

Taking the full water column into consideration, the Gulf Breeze data showed:

- 43 of 58 sample site/dates in these three subsegments showed more than 10% of the DO readings through the water column were < 5 mg/L DO.
- There were 28 site/dates in 070601 with more than 10% of readings < 5 mg/L DO; 14 site/dates in 021102; and one site/date in 120806.
- Of these 43 site/dates, 11 had more than 10% of the readings < 2 mg/L DO.
- Nine of these 11 site/dates occurred in 021102; with one each in 070601 and 120806.

LUMCON data showed that:

- 12 of 15 sample site/dates had more than 10% of the DO readings < 5 mg/L DO.
- Eight site/dates in 021102 had more than 10 percent of DO readings < 5 mg/L.
- 120806 had three site/dates; and 070601 had one site/date with over 10% of the readings < 5 mg/L DO.
- Five of the site/dates found more than 10% of the readings < 2 mg/L DO. Four of these five site/dates occurred in 021102 and one in 070601.

A DO concentration of 2.0 mg/L was used for review purposes. While 2.0 mg/L is not a DO criterion for Louisiana's coastal waters, it is a widely accepted benchmark for hypoxic conditions.

Louisiana Department of Wildlife and Fisheries (LDWF) and SeaMap data was much more difficult to summarize; however, the two data sets also showed areas of low DO at or near the bottom. Trawl data from these projects, while highly variable both spatially and temporally, showed reduced catch rates in some instances. These generally occurred more frequently in areas where low DO was found at or near the bottom prior to the trawl run.

As noted above, due to the water column nature of the data it was not possible to analyze the additional data sets using LDEQ's normal assessment process. The period of time and precise spatial distribution over which low DO occurred could not be well defined because most of the sampling was limited to short periods during the summer. In addition, both LUMCON and SeaMap sample transects were approximately 20-30 miles apart, making it impossible to determine the precise spatial extent of the hypoxic zone in the intervening area, especially where it pertains to the near coastal waters within the state three-mile limit. Despite these difficulties and limitations, careful analysis of the additional data supplied by USEPA-Region 6, LDWF and SeaMap indicated that multiple areas of low DO occurred at or near the bottom of the Gulf of Mexico within the state three-mile limit during the period 2004-2008.

Therefore, based on the reviewed supplemental data provided and the caveats noted above, LDEQ has determined that the coastal subsegments of: 021102 – Barataria Basin Coastal Bays and Gulf Waters to the state Three-Mile Limit; 070601 – Mississippi Basin Coastal Bays and Gulf Waters to the state Three-Mile Limit; and 120806 – Terrebonne Basin Coastal Bays and Gulf Waters to the state Three-Mile Limit are suspected of impairment due to low DO at or near the bottom of the water column. This suspected impairment is believed to exist primarily during summer months, but the limited temporal nature of the data precludes adequate analysis outside the summer sampling period. The suspected source of impairment has been reported as "upstream sources."

The remaining coastal subsegments either did not experience the same extent of low DO during the period of record or there was insufficient data with which to make a determination. This finding is in keeping with other coastal deltaic regions where offshore zones of hypoxia occur due to high nutrient loading from large source rivers.

In addition to determining impairment, LDEQ must make a determination of the IR category in which to place these subsegments. The Mississippi River Gulf of Mexico Watershed Nutrient Task Force, using multiple sources of independent research, has established that approximately 78% of nitrogen and 66% of phosphorus entering the Gulf of Mexico from the Mississippi River is derived from nonpoint sources of nutrients from the Mississippi and Ohio River Basins (GHAP 2008). Based on the fact that the hypoxic zone is caused largely by drainage from approximately 41% of the contiguous United States, LDEQ believes it is impossible for LDEQ or USEPA to develop a meaningful or implementable TMDL. As has been noted, LDEQ, USEPA and numerous other state and federal agencies are already engaged in a substantial water quality management program known as the GHAP. The goal of this plan is to reduce the hypoxic zone to less than 5,000 square kilometers by 2015, or approximately half the current five-year average (GHAP 2008). This GHAP time frame is substantially more compressed than the time frame allowed by USEPA to develop a TMDL. Under current USEPA guidance, states have up to 13 years to develop a TMDL for water bodies listed in category 5 of the Integrated Report. This would extend TMDL development to 2022, thus potentially delaying implementation of remedial actions in the Mississippi River basin.

Based on an analysis of the data discussed and development of the GHAP, LDEQ has determined that subsegments 021102, 070601, and 120806 will be reported on the 2008 IR as being suspected of impairment due to low DO and placed in category 4b. Category 4b is used for impairments caused by a pollutant that is being addressed by the State through other pollution control requirements. Other pollution control requirements were defined by USEPA guidance as including best management practices. LDEQ currently uses category 4b for impairments due to noxious aquatic plants using the Louisiana Aquatic Invasive Species Council as a TMDL alternative program. In addition,

LDEQ uses category 4b for several legacy pollution issues being addressed by remediation activities either completed or in progress.

During the course of the 2008 IR development, USEPA-Region 6 provided a six point matrix for determining if a nonpoint source watershed plan such as the GHAP is suitable for changing a category 5 (§303(d) list) water body to category 4b. This matrix is shown in table 3.5.4. LDEQ's determination of how the GHAP meets these requirements is included in the third column.

Table 3.5.4.

USEPA matrix for determining if a watershed action plan is suitable for use as an Integrated Report Category 4b substitute for Category 5.

USEPA 2006 IR Guidance	USEPA Nonpoint Source (NPS) Program Guidance (Numbering taken from original USEPA document)	LDEQ Assessments and Gulf Hypoxia Action Plan 2008 (GHAP) (page numbers refer to GHAP)
1) A statement of the problem causing the impairment	1) Identify causes and sources needed to be controlled to achieve estimated load reductions, and the estimated extent to which they are present in the watershed 2) An estimate of load reductions expected	1) LDEQ's 2008 Integrated Report (IR) identified low dissolved oxygen as a suspected impairment for subsegments 021102, 070601, and 120806. "Upstream sources," "agriculture," and "source unknown" were reported as the suspected sources of impairment. Nitrogen and phosphorus were not listed as suspected causes of impairment due to the lack of criteria for these parameters. 2) GHAP a) specifies phosphorus and nitrogen as the primary contributors to hypoxia (page 22); b) specifies that nonpoint sources represent 78% and 66% of nitrogen and phosphorus loading, respectively (page 23); and c) estimates a dual nutrient strategy targeting at least a 45% reduction in nitrogen and phosphorus loading as measured against 1980-1996 average load (page 22)
2) Description of the implementation strategy and controls necessary to achieve water quality standards, including the point and nonpoint source loadings, that when implemented will assure attainment of all applicable water quality standards	3) Description of NPS management measures needed to achieve loads reductions, an identification of critical areas to achieve greatest reduction 4) Estimate of technical and financial assistance needed to implement plan 5) Information and education component for improving understanding of the need for management measures that control nonpoint sources	1) The GHAP section "Actions to Accelerate the Reductions of Nitrogen and Phosphorus" (pages 28-39) describes the NPS management measures needed to achieve load reductions and identify critical areas. In addition to existing state and federal NPS management activities, the GHAP calls for development of additional strategies by 2013. 2) Technical and financial incentives are called for through the 319 program, Farm Bill, and other federal funding sources (page 33). 3) The entire GHAP as well as existing 319 and Farm Bill programs include "information and education component(s) for understanding the need for management measures that control nonpoint sources." 4) Pages 56-57 of the GHAP specifically addresses effective communication to increase awareness of hypoxia.
3) An estimate of the time frame to meet water quality standards	6) Criteria to determine whether load reductions are being achieved and progress is being made to attain standards, and if not, whether plan needs to be revised, or if TMDL needs to be revised	1) GHAP calls for an approximately 50% reduction in hypoxic zone area by 2015 (pages 9 and 14). 2) State, federal, and university monitoring will determine if load reductions are being achieved and progress is being made to attain standards (page 50).

USEPA 2006 IR Guidance	USEPA Nonpoint Source (NPS) Program Guidance (Numbering taken from original USEPA document)	LDEQ Assessments and Gulf Hypoxia Action Plan 2008 (GHAP) (page numbers refer to GHAP)
4) Reasonable schedule for implementation of control measures	7) Schedule for implementing management measures that is reasonably expeditious	1) GHAP reports on current progress in implementing management measures (page 17-19). 2) The goal of the GHAP is an approximately 50% reduction in the size of the hypoxic zone by 2015 (pages 9 and 14). This is seven years prior to completion of a TMDL, assuming these subsegments were listed in category 5 instead of category 4b as proposed by LDEQ. 3) Current NPS management practices should be continued and encouraged while improved strategies and implementation should be started by 2013. This is nine years before development of a TMDL would be required under category 5 listing.
5) Description of, and schedule for, monitoring milestones for tracking and reporting progress to USEPA on implementation of BMPs	8) Interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented 9) Monitoring component to evaluate implementation efforts measured against #6	1) See LDEQ and GHAP comments associated with 2006 IR Guidance statement 1, above. 2) Monitoring by State, Federal and university research programs is ongoing; therefore, a specific monitoring schedule is not necessary.
6) A commitment to revise, if necessary, the implementation strategy if it is determined that progress in meeting water quality standards is not satisfactory	See # 6) above	1) LDEQ is committed to ongoing work with the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force. As such, it is committed to revising the GHAP implementation strategy, within the boundaries of the task force, as needed to achieve meaningful reductions in hypoxia in the Gulf of Mexico. 2) GHAP calls for a reassessment of nitrogen and phosphorus load reductions and hypoxic conditions in 2013. As part of this the GHAP states it will "determine appropriate actions to continue to implement or, if necessary, revise this strategy." (page 58)

Chapter 6: Wetland Water Quality Assessment

Summary of Wetland Water Quality Assessments

The figures reported in table 3.6.1 are based upon the level of use support for all applicable designated uses, as determined through monitored assessments. The acres of impaired water bodies identified as being affected by various suspected causes of impairment are shown in table 3.6.2. The acres affected by various suspected sources of impairment are shown in table 3.6.3. Tables 3.6.2 and 3.6.3 refer only to those water bodies that were assessed as not supporting designated uses. The tables are not ranked by order of impact. Assessment results for all water body subsegments, as defined in ERC 33:IX.1123, table 3, can be found in Appendices A, B, and C.

Table 3.6.1.

Summary of designated use support for Louisiana wetlands, *2010 Integrated Report* assessment. (Reported in acres (water body count).)

Designated Use	Size Fully Supported	Size Not Supported	Insufficient Data	Not Assessed	Total Size for Designated Uses
Primary Contact Recreation	467,200 (3)	471,680 (2)	86,400 (1)		1,025,280 (6)
Secondary Contact Recreation	1,029,760 (7)			47,293 (9)	1,077,053 (16)
Fish and Wildlife Propagation	158,720 (2)	866,560 (4)		51,773 (10)	1,077,053 (16)
Drinking Water Supply	464,000 (1)				464,000 (1)

Suspected Causes of Non-Support of Designated Uses

Table 3.6.2.

Total sizes of Louisiana wetlands not fully supporting designated uses due to various suspected causes of impairment, *2010 Integrated Report* assessment. (reported in acres and water body count)

Suspected Cause of Impairment	Size	Count
Chloride	7,680	1
Sulfates	7,680	1
Temperature, water	7,680	1
Total Dissolved Solids	7,680	1
Mercury in Fish Tissue	199,040	1
Fecal Coliform	464,000	1
Oxygen, Dissolved	858,880	3

Suspected Sources of Non-Support of Designated Uses

Table 3.6.3.

Total sizes of Louisiana wetlands not fully supporting designated uses due to various suspected sources of impairment, *2010 Integrated Report* assessment. (reported in acres and water body count)

Suspected Sources of Impairment	Size	Count
Atmospheric Deposition - Toxics	199,040	1
Drainage/Filling/Loss of Wetlands	7,680	1
Habitat Modification - other than Hydromodification	7,680	1
Impacts from Hydrostructure Flow Regulation/modification	7,680	1
Littoral/shore Area Modifications (Non-riverine)	7,680	1
Natural Sources	464,000	1
Non-irrigated Crop Production	195,840	1
On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)	464,000	1
Petroleum/natural Gas Production Activities (Permitted)	195,840	1
Source Unknown	663,040	2

Chapter 7: Public Health/Aquatic Life Concerns

Fishing and Swimming Advisories Currently in Effect

The LDEQ currently issues fish consumption and swimming advisories in conjunction with the Louisiana Department of Health and Hospitals (LDHH) Health/Fish Consumption Advisories Program. Fish consumption advisories are set using a risk assessment-based method that establishes consumption levels designed to prevent adverse effects on public health. Risk assessments are used to determine safe consumption levels for different segments of the population. For example, children, women of childbearing age, or breastfeeding women are often considered separately in developing risk assessments because this population is generally considered to be at greater risk from consumption of contaminated seafood. Therefore, limited consumption advisories will often be stricter for this population.

Swimming advisories are generally established due to fecal coliform contamination of a water body. However, a limited number of swimming advisories have been based on chemical contamination of water or sediments. Fecal coliform contamination of a water body can be caused by a number of possible sources including absent or inadequate sewage treatment systems, poorly maintained septic tanks, direct sewage discharges from camps, pasture and animal holding area runoff, and wildlife. Efforts are being made to correct these problems statewide. For the latest information on advisories please refer to LDEQ's web site at:
http://www.deq.louisiana.gov/portal/Default.aspx?tabid=1631.

Part IV: Groundwater Assessment

Introduction

The LDEQ Nonpoint Source Pollution Control and Aquifer Evaluation and Protection Section's **ASSET PROGRAM** (Aquifer Sampling and Assessment Program) provides water quality data from freshwater aquifers around the state. The ASSET Program is an ambient ground water monitoring program designed to determine and monitor the quality of ground water produced from Louisiana's major freshwater aquifers. The ASSET Program samples approximately 200 water wells located in 14 aquifers and aquifer systems across the state. The sampling process is designed so that all 14 aquifers and aquifer systems are monitored on a rotating basis, within a three-year period so that each well is monitored every three years.

In order to better assess the water quality of a particular aquifer, an attempt is made to sample all ASSET Program wells producing from it in a narrow time frame. To more conveniently and economically promulgate those data collected, a summary report on each aquifer is prepared separately.

The USEPA has encouraged states to select an aquifer or hydrogeologic setting and discuss available data that best reflects the quality of the resource. For this report, fiscal year 2008 ASSET Program data from the Mississippi River Alluvial aquifer summary is presented. This aquifer represents, geologically, some of the youngest and shallowest freshwater aquifers in Louisiana. Table 4.1.1 shows the hydrogeologic column of aquifers in Louisiana and the occurrence of the Mississippi River Alluvial aquifer compared to other aquifers in the state.

Table 4.1.2 is designed to provide an indication of the most critical contaminant sources and contaminants impacting ground water resources in Louisiana. Table 4.1.3 provides a summary of Louisiana ground water protection programs with listing of legislation, statutes, rules, and/or regulations that are in place. It also provides an indication of the comprehensive nature of ground water protection activities in Louisiana. Table 4.1.4 provides a quick look at the number of wells used for this report, the number of wells reporting non-detects for parameter groups of interest, and a more detailed look at the occurrence of nitrite-nitrate (NO2NO3). Table 4.1.5 lists the wells sampled, their total depths, the use made of produced waters, and date sampled. For quality control, duplicate samples were taken for each parameter at wells AV-462, IB-COM, MA-206, RI-48, and SMN-33.

Table 4.1.6 lists the field and conventional parameters, and Table 4.1.7 lists the inorganic (total metals) parameters for which samples were collected. They also detail the analytical results for those parameters for each well. Table 4.1.8 lists the field and conventional parameters' statistical values for minimum, maximum and average concentrations. Table 4.1.9 provides a listing of inorganic statistics of minimum, maximum, and average values. It should be noted that per departmental standard procedure, one-half the detection limit is used when determining averages when a non-detect (ND) is reported. This procedure is utilized throughout the groundwater portion (**Part IV**) of this report whenever average values are listed or discussed. Also note that the terms Laboratory Detection Limit, Detection Limit (DL), and Method Detection Limit (MDL), are used interchangeably in **Part IV** of this report.

Ambient Monitoring Network for Mississippi River Alluvial Aquifer

The data that follow were derived from the Aquifer Sampling and Assessment Program (ASSET Program). The program is conducted as a Clean Water Act activity, with the objectives of determining and monitoring the quality of ground water produced from the freshwater aquifers across Louisiana, and providing water quality data to the department, other state and federal agencies, and the corporate and private citizens of Louisiana.

Data contained in Table 4.1.5 show that from July to September 2007 and in January 2008, 23 wells were sampled which produce from the Mississippi River Alluvial aquifer. Eight of these 23 wells are classified as domestic, 7 are classified as irrigation, 7 as public supply and one industrial use well. The wells are located in 14 parishes along or near the Mississippi River.

Well data for registered water wells were obtained from the Louisiana Department of Transportation and Development's Water Well Registration Data file.

Geology

Mississippi River alluvium consists of fining upward sequences of gravel, sand, silt, and clay. The aquifer is poorly to moderately well sorted, with fine-grained to medium-grained sand near the top, grading to coarse sand and gravel in the lower portions. It is confined by layers of silt and clay of varying thicknesses and extent. The Mississippi

River Alluvial aquifer consists of two distinct components: valley trains and meander-belt deposits, which are closely related hydrologically.

Hydrogeology

The Mississippi River Alluvial aquifer is hydraulically connected with the Mississippi River and its major streams. Recharge is accomplished by direct infiltration of rainfall in the river valley, lateral and upward movement of water from adjacent and underlying aquifers, and overbank stream flooding. The amount of recharge from rainfall depends on the thickness and permeability of the silt and clay layers overlying it. Water levels fluctuate seasonally in response to precipitation trends and river stages. Water levels are generally within 30 to 40 feet of the land surface, and movement is downgradient and toward rivers and streams. Natural discharge occurs by seepage of water into the Mississippi River and its streams, but some water moves into the aquifer when stream stages are above aquifer water levels. The hydraulic conductivity varies between 10 and 530 feet/day.

The maximum depths of occurrence of freshwater in the Mississippi River Alluvial range from 20 feet below sea level to 500 feet below sea level. The range of thickness of the fresh water interval in the Mississippi River Alluvial is 50 to 500 feet. The depths of the Mississippi River Alluvial aquifer wells that were monitored in conjunction with ASSET program range from 30 to 352 feet below land surface.

Program Parameters

The field parameters checked at each sampling site and the list of conventional parameters analyzed in the laboratory are shown in Table 4.1.6 The inorganic (total metals) parameters analyzed in the laboratory are listed in Table 4.1.7 These tables also show the field and analytical results determined for each analyte. Table 4.1.12 lists the Federal Maximum Contaminant Level (primary and secondary) and Action Level for applicable parameters.

In addition to the conventional and inorganic analytical parameters, the target analyte list includes three other categories of compounds: volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and pesticides/PCBs. Due to the large number of analytes in these categories, tables were not prepared showing the analytical results for these compounds. A discussion of any detections from any of these three categories, if necessary, can be found in their respective sections. Tables 4.1.13, 4.1.14, and 4.1.15 list the target analytes and detection limits for volatiles, semi-volatiles and pesticides/PCBs, respectively.

Tables 4.1.8 and 4.1.9 provide a statistical overview of conventional and inorganic data for the Mississippi River Alluvial aquifer, listing the minimum, maximum, and average results for these parameters. Tables 4.1.10 and 4.1.11 compare these same parameter averages from FY 2008 to historical ASSET-derived data for the Mississippi River Alluvial aquifer from fiscal years 1996, 1999, 2002, and 2005.

Figure 4.1.1 shows the geographic locations of the Mississippi River Alluvial aquifer and the associated wells, whereas Figures 4.1.2, 4.1.3, 4.1.4, and 4.1.5, respectively, represent the contoured average values for pH, TDS, chloride and iron. The remaining figures (4.1.6 through 4.1.21) represent the trend of the graphed parameter, based on the averaged value of that parameter for each three-year reporting period. Discussion of historical data and related trends is found in the **Water Quality Trends and Comparison to Historical ASSET Program Data** section.

Interpretation of Data

Under the Federal Safe Drinking Water Act, EPA has established maximum contaminant levels (MCLs) for pollutants that may pose a health risk in public drinking water. An MCL is the highest level of a contaminant that EPA allows in public drinking water. MCLs ensure that drinking water does not pose either a short-term or long-term health risk. While not all wells sampled were public supply wells, the Office of Environmental Compliance does use MCLs as a benchmark for further evaluation.

EPA has also set secondary standards, which are defined as non-enforceable taste, odor, or appearance guidelines. Field and laboratory data contained in Tables 4.1.6 and 4.1.7 show that one or more secondary MCLs (SMCLs) were exceeded in 19 of the 23 wells sampled in the Mississippi River Alluvial aquifer, with a total of 33 SMCLs exceeded.

In addition to primary and secondary MCLs, EPA has established Action Levels for particular compounds. If the action levels are exceeded, then a Treatment Technique is required by public water supply systems to control the

corrosiveness of the distributed water. Data contained in Table 4.1.7 show that no Action Level was exceeded in any of the ASSET Program wells sampled for this time period.

Field and Conventional Parameters

Table 4.1.6 shows the field and conventional parameters for which samples are collected at each well and the analytical results for field and laboratory parameters. Table 4.1.8 provides an overview of these parameters for the Mississippi River Alluvial aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards

A review of the analysis listed in Table 4.1.6 shows that no primary MCL was exceeded for field and conventional parameters for this reporting period. Those ASSET wells reporting turbidity levels greater than 1.0 NTU do not exceed the Primary MCL of 1.0, as this standard applies to surface water systems and ground water systems under the direct influence of surface water.

Federal Secondary Drinking Water Standards

A review of the analysis listed in Table 4.1.6 shows that 1 well exceeded the SMCL for pH, 9 wells exceeded the SMCL for total dissolved solids (based on lab results; 12 wells based on field measurements), 1 well exceeded the SMCL for chloride, 3 wells exceeded the SMCL for color (11 wells were not analyzed for color) and 1 well exceeded the SMCL for sulfate (SO4). Laboratory results override field results in exceedance determination, thus only laboratory results will be counted in determining SMCL exceedance numbers for TDS. Following is a list of SMCL parameter exceedances with well number and results:

pH (SMCL = 6.5 – 8.5 Standard Units):
AV-126 – 8.52 SU

Total Dissolved Solids (SMCL = 500 mg/L or 0.5 g/L):

	Lab Results (in mg/L)	Field Measures (in g/L)
AV-126	464 mg/L (<SMCL)	0.55 g/L
AV-462	1,012 mg/L, Duplicate – 1,000 mg/L	1.04 g/L (Original and Duplicate)
AV-5135Z	638 mg/L	0.72 g/L
CO-YAKEY	648 mg/L	0.75 g/L
CT-241	534 mg/L	0.63 g/L
EB-885	476 mg/L (<SMCL)	0.51 g/L
FR-1358	1,314 mg/L	1.45 g/L
IB-COM	754 mg/L, Duplicate – 750 mg/L	0.91 g/L (Original and Duplicate)
SL-5477Z	538 mg/L	0.64 g/L
TS-60	524 mg/L	0.56 g/L
TS-FORTENB	482 mg/L (< SMCL)	0.55 g/L
WC-527	704 mg/L	0.76 g/L
WC-91	482 mg/L (<SMCL)	0.57 g/L

Chloride (SMCL = 250 mg/L):
FR-1358 – 602 mg/L

Color (SMCL = 15 color units (PCU)):
AV-126 – 110 PCU
CT-241 – 50 PCU
FR-1358 – 40 PCU
(Eleven wells were not analyzed for color.)

Sulfate (SMCL = 250 mg/L):
AV-462 – 263 mg/L, Duplicate – 260 mg/L

Inorganic Parameters

Table 4.1.7 shows the inorganic (total metals) parameters for which samples are collected at each well and the analytical results for those parameters. Table 4.1.9 provides an overview of inorganic data for the Mississippi River Alluvial aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards:

A review of the analyses listed on Table 4.1.7 shows that the Primary MCL for arsenic was exceeded in 6 of the 23 wells sampled for this time period:

Arsenic (MCL = 10 ug/L):

EB-885 – 36.2 ug/L
IB-363 – 32.6 ug/L
IB-5427Z – 36.8 ug/L
MA-206 – 11.6 ug/L, Duplicate – 12.2 ug/L
SL-5477Z – 65.2 ug/L
TS-FORTENB – 14.4 ug/L
MA-206 was resampled on 11/28/2007: results were 12.3 ug/L (Duplicate – 11.9 ug/L).

Federal Secondary Drinking Water Standards:

Laboratory data contained in Table 4.1.7 show that 18 wells exceeded the secondary MCL for iron:

Iron (SMCL = 300 ug/L):

AV-126 – 12,700 ug/L
AV-462 – 5,030 ug/L, Duplicate – 5,010 ug/L
CO-YAKEY – 15,300 ug/L
CT-241 – 9,740 ug/L
EB-885 – 4,180 ug/L
EC-370 – 17,400 ug/L
FR-1358 – 5,400 ug/L
IB-363 – 1,990 ug/L
IB-5427Z – 778 ug/L
IB-COM – 4,160 ug/L, Duplicate – 4,110 ug/L
MA-206 – 11,400 ug/L, Duplicate – 11,500 ug/L
MO-871 – 5,760 ug/L
SL-5477Z – 22,700 ug/L
SMN-33 – 2,010 ug/L, Duplicate – 2,020 ug/L
TS-60 – 8,850 ug/L
TS-FORTENB – 12,600 ug/L
WC-527 – 3,630 ug/L
WC-91 – 720 ug/L

Volatile Organic Compounds

Table 4.1.13 shows the volatile organic compound (VOC) parameters for which samples are collected at each well. Due to the number of analytes in this category, analytical results are not tabulated; however, any detection of a VOC would be discussed in this section.

No VOC was detected at or above its detection limit during the FY 2008 sampling of the Mississippi River Alluvial aquifer.

Semi-Volatile Organic Compounds

Table 4.1.14 shows the semi-volatile organic compound (SVOC) parameters for which samples are collected at each well. Due to the number of analytes in this category, analytical results are not tabulated; however, any detection of a SVOC would be discussed in this section.

There were no confirmed detections of any SVOC at or above its detection limit during the FY 2008 sampling of the Mississippi River Alluvial aquifer.

Pesticides and PCBs

Table 4.1.15 shows the pesticide and PCB parameters for which samples are collected at each well. Due to the number of analytes in this category, analytical results are not tabulated; however, any detection of a pesticide or PCB would be discussed in this section.

No pesticide or PCB was detected at or above its detection limit during the FY 2008 sampling of the Mississippi River Alluvial aquifer.

Water Quality Trends and Comparison to Historical ASSET Program Data

Analytical and field data show that the quality and characteristics of ground water produced from the Mississippi River Alluvial aquifer exhibit some changes when comparing current data to that of the four previous sampling rotations (three, six, nine and twelve years prior). These comparisons can be found in Tables 4.1.10 and 4.1.11, and in Figures 4.1.6 to 4.1.21 of this summary. Over the twelve-year period, 7 analytes have shown a general increase in concentration. These analytes are: pH, temperature, specific conductance (field and lab), salinity, sulfate, hardness and iron. For this same time period, 10 analytes have demonstrated a decrease in concentrations, which are: chloride, color, total dissolved solids, ammonia, nitrite-nitrate, TKN, barium, copper, zinc, and to a lesser degree, total phosphorus.

The number of wells with secondary MCL exceedances for FY 2008 is practically the same as the previous sampling event in FY 2005. Sample results for FY 2008 show that 19 wells reported one or more secondary exceedances, while the FY 2005 sampling of the Mississippi River Alluvial aquifer shows that 20 wells reported one or more SMCL exceedances. The total number of secondary exceedances, however, has decreased since the last sampling of this aquifer. Fiscal Year 2008 sample results show that a total of 33 SMCLs were exceeded, while the FY 2005 sampling reported a total of 55 secondary exceedances.

Summary and Recommendations

In summary, the data show that the ground water produced from the Mississippi River Alluvial aquifer is very hard (classification based on hardness scale from: Peavy, H. S. et al., *Environmental Engineering*, 1985). The Primary MCL for arsenic was the only short-term or long-term health risk guideline that was exceeded, however this exceedance occurred in 6 of the 23 wells sampled in this aquifer. The data also show that this aquifer is of poor quality when considering taste, odor or appearance guidelines, with 33 Secondary MCLs exceeded in 19 wells.

Comparison to historical ASSET-derived data shows some change in the quality or characteristics of the Mississippi River Alluvial aquifer, with 7 parameters showing consistent increases in concentration and 10 parameters decreasing in concentration. This comparison also shows that there was a smaller total number of secondary standards exceeded for this reporting period, with 33 SMCLs exceeded, while there were 55 SMCLs exceeded in the previous sampling in FY 2005.

The occurrence of arsenic in the Mississippi River Alluvial aquifer has been established by historical activities of this program, with current sampling results supporting those previous findings. Sampling results for this reporting period, FY 2008, show that a total of 10 wells reported detections of arsenic, while 6 of those 10 exceeded the Safe Drinking Water standard for arsenic (10 ug/L). As a standard procedure of the ASSET Program, all well owners receive the results of their well sampling, while those well owners with Primary MCL exceedances are given additional information about the particular compound, its health effects, and possible treatment methods.

It is recommended that the wells assigned to the Mississippi River Alluvial aquifer be re-sampled as planned, in approximately three years, with continued attention given to the occurrence of arsenic in this aquifer. In addition, several wells should be added to those currently in place to increase the well density for this aquifer.

Table 4.1.1.

Hydrogeologic column of aquifers in Louisiana. Highlighted units designate occurrence of the Mississippi River Alluvial aquifer in specified areas of the state.

SYSTEM	SERIES	Stratigraphic Unit		Hydrogeologic Unit: Northern Louisiana — Aquifer or confining unit	Central and southwestern Louisiana — Aquifer system or confining unit	Central and southwestern Louisiana — Aquifer or confining unit: Lake Charles area	Central and southwestern Louisiana — Aquifer or confining unit: Rice growing area	Southeastern Louisiana — Aquifer system or confining unit	Southeastern Louisiana — Aquifer[1] or confining unit: Baton Rouge area	Southeastern Louisiana — Aquifer[1] or confining unit: St. Tammany, Tangipahoa, and Washington Parishes	Southeastern Louisiana — Aquifer[1] or confining unit: New Orleans area and lower Mississippi River parishes
Quaternary	Pleistocene	Red River alluvial deposits Miss. River alluvial deposits Northern La. Terrace deposits Unnamed Pleistocene deposits		Red River alluvial aquifer or surficial confining unit Mississippi River alluvial aquifer or surficial confining unit Upland terrace aquifer or surficial confining unit	Chicot aquifer system or surficial confining unit	"200-foot" sand	Upper sand unit	Chicot Equivalent aquifer system[2] or surficial confining unit	Mississippi River alluvial aquifer or surficial confining unit Shallow sand "400-foot" sand "600-foot" sand	Upland terrace aquifer Upper Ponchatoula aquifer	Gramercy aquifer[3] Norco aquifer[3] Gonzales-New Orleans Aquifer[3] "1,200-foot" sand[3]
						"500-foot" sand "700-foot" sand	Lower sand unit				
Tertiary	Pliocene -----?----- Miocene	Fleming Formation	Blounts Creek Member	Pliocene-Miocene aquifers are absent in this area	Evangeline aquifer or surficial confining unit			Evangeline equivalent aquifer system[2] or surficial confining unit	"800-foot" sand "1,000-foot" sand "1,200-foot" sand "1,500-foot" sand "1,700-foot" sand	Lower Ponchatoula Aquifer Big Branch aquifer Kentwood aquifer Abita aquifer Covington aquifer Slidell aquifer	
			Castor Creek Member		Castor Creek confining unit			Unnamed confining unit	"2,000-foot" sand "2,400-foot" sand "2,800-foot" sand	Tchefuncte aquifer Hammond aquifer Amite aquifer Ramsay aquifer Franklinton aquifer	
			Williamson Creek Member Dough Hills Member Carnahan Bayou Member		Jasper aquifer system or surficial confining unit	Williamson Creek aquifer Dough Hills confining unit Carnahan Bayou aquifer		Jasper equivalent aquifer system[2] or surficial confining unit			
			Lena Member		Lena confining unit			Unnamed confining unit			
	-----?----- Oligocene	Catahoula Formation			Catahoula aquifer			Catahoula equivalent aquifer system[2] or surficial confining unit			
		Vicksburg Group, undifferentiated		Vicksburg-Jackson confining unit							
	Eocene	Jackson Group, undifferentiated									
		Claiborne Group	Cockfield Formation	Cockfield aquifer or surficial confining unit							
			Cook Mountain Formation	Cook Mountain aquifer or confining unit							
			Sparta Sand	Sparta aquifer or surficial confining unit							
			Cane River Formation	Cane River aquifer or confining unit							
			Carrizo Sand ?	Carrizo-Wilcox aquifer or surficial confining unit							
	Paleocene	Wilcox Group, undifferentiated									
		Midway Group, undifferentiated		Midway confining unit							

No fresh water occurs in older aquifers

[1]Clay units separating aquifers in southeastern Louisiana are discontinuous and unnamed.
[2]Four aquifer systems as a group are called the Southern Hills aquifer system.
[3]Four aquifers as a group are called the New Orleans aquifer system.

Source: DOTD/USGS Water Resources Special Report No. 9, 1995

Index to Table 4.1.2.

Factors in selecting a contaminant source

A. Human health and/or environmental risk (toxicity)
B. Size of the population at risk
C. Location of the sources relative to drinking water sources
D. Number and/or size of contaminant sources
E. Hydrogeologic sensitivity
F. State findings, other findings
G. Documented from mandatory reporting
H. Geographic distribution/occurrence
I. Other criteria - high to very high priority in localized areas of the state

Contaminants

A. Inorganic pesticides
B. Organic pesticides
C. Halogenated solvents
D. Petroleum compounds
E. Nitrate
F. Fluoride
G. Salinity/brine
H. Metals
I. Radionuclides
J. Bacteria
K. Protozoa
L. Viruses
M. Other - sulfates from gypsum stacks

Table 4.1.2.
Major sources of ground water contamination in the freshwater aquifers of Louisiana.

Contaminant Source	Ten Highest-Priority Sources(√)	Factors in Selecting a Contaminant Source	Contaminants
Agricultural Activities			
Agricultural chemical facilities			
Animal feedlots			
Drainage wells			
Fertilizer applications			
Irrigation practices			
Pesticide applications			
On-farm agricultural mixing and loading procedures			
Land application of manure (unregulated)			
Storage and Treatment			
Land Application			
Material stockpiles			
Storage tanks (above ground)	√	A,B,C,D,E,F,G	B,C,D
Storage tanks (underground)	√	A,B,C,D,E,F,	B,C,D
Surface impoundments	√	A,B,C,D,E,F,G	C,D,G,H,J,L
Waste piles	√	D,G	I,M
Waste tailings			
Disposal Activities			
Deep injection wells			
Landfills	√	A,B,C,D,E,F,G	A,B,C,D,E,H
Septic systems	√	C,D,G	A,B,C,D,E,H,J,L
Shallow injection wells			
Other			
Hazardous waste generators*			
Hazardous waste sites*			
Industrial facilities*			
Material transfer operations*			
Mining and mine drainage			
Pipelines and sewer lines	√	A,B,C,D,E,F,G	C,D,G
Salt storage and road salting			
Salt water intrusion	√	B,C,E,G	G
Spills	√	B,D,G	C,D
Transportation of materials			
Urban runoff	√	A,B,D,G	A,B,C,D,E,H,J,L
Small-scale manufacturing and repair shops			
Other sources (please specify)			

* Represents facilities with multiple sources of ground water contamination rather than unit sources.

Table 4.1.3.
State ground water protection programs for Louisiana with their implementation status.

Programs or Activities	Check	Implementation Status	Responsible State Agency
Active SARA Title III Program	√	Fully established	LDEQ
Ambient ground water monitoring system	√	Fully established	LDEQ
Aquifer vulnerability assessment	√	Fully established	LDEQ
Aquifer mapping	√	Fully established	LDEQ
Aquifer characterization	√	Continuing efforts	LDOTD
Comprehensive data management system	√	Continuing efforts	LDEQ
EPA-endorsed Core Comprehensive State Ground Water Protection Program (CSGWPP)	√	Pending	LDEQ
Ground water discharge permits	√	Fully established	LDNR(UIC)
Ground water Best Management Practices	√	Continuing efforts	LDEQ
Ground water legislation	√	Fully Established	LDNR
Ground water classification	√	Fully established	LDEQ
Ground water quality standards	√	Continuing efforts	LDEQ
Interagency coordination for ground water protection initiatives	√	Fully established	LDEQ
Nonpoint source controls	√	Continuing efforts	LDEQ
Pesticide State Management Plan	√	Fully Established	LDAF
Pollution Prevention Program	√	Continuing efforts	LDEQ
Resource Conservation and Recovery Act (RCRA) Primacy	√	Fully established	LDEQ
Source Water Assessment Program	√	Fully established	LDEQ
State Superfund	√	Fully established	LDEQ
State RCRA Program incorporating more stringent requirements than RCRA Primacy	√	Continuing efforts	LDEQ
State septic system regulations	√	Fully established	LDHH
Underground storage tank installation requirements	√	Fully established	LDEQ
Underground Storage Tank Remediation Fund	√	Fully established	LDEQ
Underground Storage Tank Permit Program	√	Fully established	LDEQ
Underground Injection Control Program	√	Fully established	LDNR
Vulnerability assessment for drinking water/wellhead protection	√	Fully established	LDEQ
Well abandonment regulations	√	Fully established	LDOTD/LDNR*
Wellhead Protection Program (EPA-approved)	√	Fully established	LDEQ
Well installation regulations	√	Fully established	LDOTD/LDNR*

* State legislation passed in 2009 Regular Session is causing these programs to be moved from the Department of Transportation and Development to the Department of Natural Resources.

Table 4.1.4.

Monitoring Data

Hydrogeologic Setting: **Pleistocene Age Aquifer**
Spatial Description: **Along or Near the Mississippi River**
Map Available: **See Figure 4.1.1**
Data Reporting Period: **July 2007 – January 2008**

Monitoring Data Type	Total No. of Wells Used in the Assess-ment	Parameter Groups	Number of Wells									
			No detections of parameters above MDLs or background levels		Nitrite/nitrate concentrations range from background levels to less than or equal to 5 mg/l. No detections of parameters other than nitrite/nitrate above MDLs or background levels and/or located in areas that are sensitive or vulnerable.			Nitrite/nitrate ranges from greater than 5 to less than or equal to 10 mg/l. Other parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs.	Parameters are detected at concentrations exceeding the MCLs	Number of wells removed from service	Number of wells requiring special treatment	Back-ground para-meters exceed MCLs
			ND	Number of wells in sensitive or vulnerable areas	Nitrite/ nitrate < 1 mg/l	Nitrite/ nitrate ≥ 1 to ≤5 mg/l	Number of wells in sensitive or vulnerable areas					
Ambient Monitoring Network	23	VOC	23									
		SVOC	23									
		*NO2NO3	17		4	2						
		†Other	0					23	‡6			

* The parameter NO2NO3 (nitrite-nitrate) is included in the "Conventional" group of parameters.

† For Other category, the following metals with Primary Drinking Water Standards or Action Levels were considered: Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Lead, Mercury, Selenium, and Thallium.

‡ All MCL exceedances were for arsenic. See discussion in **Federal Primary Drinking Water Standards** and **Summary and Recommendations** sections and tabulated results in Table 4.1.7 of this report.

Table 4.1.5.

List of ASSET wells sampled that are completed in the Mississippi River Alluvial aquifer.

DOTD Well Number	Parish	Date	Owner	Depth (Feet)	Well Use
AV-126	AVOYELLES	1/8/2008	PRIVATE OWNER	155	DOMESTIC
AV-462	AVOYELLES	8/20/2007	PRIVATE OWNER	110	IRRIGATION
AV-5135Z	AVOYELLES	8/20/2007	PRIVATE OWNER	110	DOMESTIC
CO-YAKEY	CONCORDIA	8/21/2007	PRIVATE OWNER	150	DOMESTIC
CT-241	CATAHOULA	8/21/2007	PRIVATE OWNER	134	IRRIGATION
CT-DENNIS	CATAHOULA	9/17/2007	PRIVATE OWNER	30	DOMESTIC
EB-885	EAST BATON ROUGE	7/24/2007	PRIVATE OWNER	352	IRRIGATION
EC-370	EAST CARROLL	8/27/2007	PRIVATE OWNER	119	IRRIGATION
FR-1358	FRANKLIN	9/17/2007	PRIVATE OWNER	60	IRRIGATION
IB-363	IBERVILLE	7/24/2007	SYNGENTA CROP PROTECTION, INC.	225	INDUSTRIAL
IB-5427Z	IBERVILLE	7/23/2007	PRIVATE OWNER	160	DOMESTIC
IB-COM	IBERVILLE	1/7/2008	PRIVATE OWNER	185	DOMESTIC
MA-206	MADISON	8/27/2007	TALLULAH WATER SERVICE	130	PUBLIC SUPPLY
MO-871	MOREHOUSE	8/28/2007	PRIVATE OWNER	80	IRRIGATION
RI-469	RICHLAND	9/17/2007	LIDDIEVILLE WATER SYSTEM	90	PUBLIC SUPPLY
RI-48	RICHLAND	9/17/2007	RAYVILLE WATER DEPARTMENT	115	PUBLIC SUPPLY
RI-730	RICHLAND	8/28/2007	START WATER SYSTEM	101	PUBLIC SUPPLY
SL-5477Z	ST LANDRY	7/24/2007	PRIVATE OWNER	110	DOMESTIC
SMN-33	ST MARTIN	7/23/2007	LDOTD/LAFAYETTE DISTRICT	125	PUBLIC SUPPLY
TS-60	TENSAS	9/17/2007	TOWN OF ST. JOSEPH	140	PUBLIC SUPPLY
TS-FORTENB	TENSAS	9/17/2007	PRIVATE OWNER	UNKNOWN	DOMESTIC
WC-527	WEST CARROLL	8/27/2007	PRIVATE OWNER	85	IRRIGATION
WC-91	WEST CARROLL	8/27/2007	NEW CARROLL WTR. ASSN.	115	PUBLIC SUPPLY

Table 4.1.6.

Field measurements and conventional laboratory analytical results for parameters listed.

DOTD Well Number	pH SU	Sal. ppt	Sp. Cond. mmhos/ cm	TDS g/L	Temp Deg. C	Alk mg/L	NH3 mg/L	Cl mg/L	Color PCU	Hard. mg/L	Nitrite-Nitrate (as N) mg/L	TKN mg/L	Tot. P mg/L	Sp. Cond. umhos/cm	SO4 mg/L	TDS mg/L	TSS mg/L	Turb. NTU
	Laboratory Detection Limits (MDL) →					**2.0**	**0.1**	**1.3**	**5.0**	**5.0**	**0.05**	**0.1**	**0.05**	**10**	**1.25**	**4.0**	**4.0**	**1.0**
	Field Parameters					**Conventional Laboratory Parameters**												
AV-126	8.52	0.42	0.845	0.55	20.10	407	0.5	25.8	‡110	457	<0.05	0.5	0.92	762	16.3	464	25	91
AV-462	7.40	0.81	1.601	1.04	20.69	428	0.18	110	<5	511	<0.05	0.3	0.24	1557	‡263	1012	9	63.4
AV-462*	7.40	0.81	1.601	1.04	20.69	429	0.15	110	<5	509	<0.05	0.28	0.25	1556	‡260	1000	13	63.8
AV-5135Z	7.02	0.55	1.111	0.72	21.54	335	0.12	101	<5	417	<0.05	0.2	0.14	1086	85.3	638	<4	<1
CO-YAKEY	7.09	0.57	1.153	0.75	23.91	607	3.32	28	15	491	<0.05	‡4.26	1.07	1121	<1.2	648	39	207
CT-241	7.18	0.48	0.97	0.63	20.41	490	1.27	22.3	50	425	<0.05	1.42	0.89	918	<1.2	534	24	102
CT-DENNIS	6.66	0.09	0.198	0.13	21.28	82.9	<0.1	11	<5	78.1	0.09	<0.1	<0.0	199	4.2	160	<4	<1
EB-885	7.21	0.38	0.78	0.51	20.82	427	2.08	11.6	No Data	357	<0.05	2.11	0.26	785	<1.2	476	10	46.4
EC-370	6.89	0.37	0.757	0.49	19.71	406	0.94	10		400	<0.05	1.19	1.08	724	1.5	416	38	143
FR-1358	6.73	1.14	2.228	1.45	20.45	292	0.28	‡602	40	468	0.15	‡0.5	0.35	2370	13.4	1314	9	34.9
IB-363	7.74	0.31	0.645	0.42	18.98	232	1.22	52.8	No Data	215	<0.05	1.32	0.59	638	18	360	5.5	14.4
IB-5427Z	7.70	0.19	0.39	0.25	21.66	149	1.07	23.5		146	<0.05	1.14	0.35	367	15	220	<4	1.7
IB-COM	7.13	0.70	1.392	0.91	20.85	336	0.27	‡246	10	376	<0.05	0.27	0.15	1307	<1.2	754	7	44.8
IB-COM*	7.13	0.70	1.392	0.91	20.85	338	0.32	‡243	10	377	<0.05	0.34	0.15	1312	<1.2	750	8	50.6
MA-206	6.92	0.36	0.738	0.48	20.24	400	0.66	13.9	No Data	369	<0.05	0.97	0.95	729	4.4	430	28	115
MA-206*	6.92	0.36	0.738	0.48	20.24	406	0.67	13.9		371	<0.05	0.99	0.94	734	4.4	438	27	123
MO-871	6.92	0.33	0.672	0.44	19.49	250	0.13	42.9		296	<0.05	0.27	0.32	649	35.1	394	11	10.4
RI-469	7.14	0.12	0.253	0.16	20.29	56.7	<0.1	31.4	<5	85.1	4.94‡	<0.1	0.2	261	4.7	184	<4	<1
RI-48	7.29	0.31	0.636	0.41	20.27	269	<0.1	37.9	<5	262	0.28	0.15	0.17	644	25.1	390	<4	1
RI-48*	7.29	0.31	0.636	0.41	20.27	269	<0.1	37.9	<5	261	0.28	0.15	0.16	644	25.1	390	<4	1.4
RI-730	7.49	0.22	0.457	0.30	20.10	151	<0.1	34.5	No Data	183	1.44	<0.1	0.11	453	28.9	300	<4	<1
SL-5477Z	6.92	0.49	0.984	0.64	21.27	470	5.98	25.4		389	<0.05	‡6.11	‡1.89	907	<1.2	538	56	235
SMN-33	7.68	0.25	0.507	0.33	18.66	234	0.94	21.4		222	<0.05	1.07	0.32	498	<1.2	292	6	11.8
SMN-33*	7.68	0.25	0.507	0.33	18.66	236	0.92	21.4		222	‡<0.1	1.1	0.32	497	<1.2	294	6.5	12.7
TS-60	6.73	0.42	0.856	0.56	19.67	447	0.92	34.1	<5	391	<0.05	1.12	0.55	863	<1.2	524	21	104
TS-FORTENB	6.98	0.41	0.838	0.55	20.72	451	1.32	16.3	<5	383	<0.05	1.33	0.77	811	<1.2	482	29	180
WC-527	7.02	0.58	1.168	0.76	19.79	499	0.18	77.5	No Data	504	0.21	0.3	0.19	1141	42.1	704	7	36.7
WC-91	7.27	0.43	0.88	0.57	19.57	312	0.2	101		387	<0.05	0.31	0.08	872	12.6	482	<4	6.5

* Denotes Duplicate Sample; ‡ Reported From a Dilution; Exceeds USEPA Secondary Standards

Table 4.1.7.

Laboratory analytical results for the inorganic (Total Metals) parameters listed.

DOTD Well Number	Antimony ug/L	Arsenic ug/L	Barium ug/L	Beryllium ug/L	Cadmium ug/L	Chromium ug/L	Copper ug/L	Iron ug/L	Lead ug/L	Mercury ug/L	Nickel ug/L	Selenium ug/L	Silver ug/L	Thallium ug/L	Zinc ug/L
Laboratory Detection Limits (MDL)	**1**	**3**	**2**	**1**	**0.5**	**5**	**3**	**20**	**3**	**0.05**	**3**	**4**	**0.5**	**1**	**10**
AV-126	<1	<3	454	<1	<0.5	<3	<3	12,700	<3	0.06	<3	<4	<0.5	<1	82.4
AV-462	<1	<3	61.9	<1	<0.5	<3	<3	5,030	<3	<0.05	<3	<4	<0.5	<1	<10
AV-462*	<1	<3	61.6	<1	<0.5	<3	<3	5,010	<3	<0.05	<3	<4	<0.5	<1	<10
AV-5135Z	<1	<3	174	<1	<0.5	<3	<3	87.9	<3	<0.05	<3	<4	<0.5	<1	<10
CO-YAKEY	<1	<3	866	<1	<0.5	<3	<3	15,300	<3	0.07	<3	<4	<0.5	<1	<10
CT-241	<1	6.7	416	<1	<0.5	<3	<3	9,740	<3	<0.05	<3	<4	<0.5	<1	<10
CT-DENNIS	<1	<3	62.6	<1	<0.5	<3	9.8	49.8	<3	R	<3	<4	<0.5	<1	<10
EB-885	<1	36.2	691	<1	<0.5	<3	<3	4,180	<3	<0.05	<3	<4	<0.5	<1	<10
EC-370	<1	<3	634	<1	<0.5	<3	<3	17,400	<3	<0.05	<3	<4	<0.5	<1	<10
FR-1358	<1	<3	309	<1	<0.5	<3	<3	5,400	<3	R	<3	<4	<0.5	<1	<10
IB-363	<1	32.6	432	<1	<0.5	<3	<3	1,990	<3	<0.05	<3	<4	<0.5	<1	<10
IB-5427Z	<1	36.8	190	<1	<0.5	<3	<3	778	<3	<0.05	<3	<4	<0.5	<1	<10
IB-COM	<1	5.9	727	<1	<0.5	<3	<3	4,160	<3	0.12	<3	<4	<0.5	<1	65
IB-COM*	<1	6.1	720	<1	<0.5	<3	<3	4,110	<3	0.08	<3	<4	<0.5	<1	65.4
MA-206	<1	11.6	500	<1	<0.5	<3	<3	11,400	<3	<0.05	<3	<4	<0.5	<1	<10
MA-206*	<1	12.2	502	<1	<0.5	<3	<3	11,500	<3	<0.05	<3	<4	<0.5	<1	<10
MO-871	<1	3.8	316	<1	<0.5	<3	<3	5,760	<3	0.05	<3	<4	<0.5	<1	<10
RI-469	<1	<3	33.6	<1	<0.5	3.9	<3	<20	<3	R	<3	<4	<0.5	<1	260
RI-48	<1	<3	90.1	<1	<0.5	<3	<3	119	<3	R	<3	<4	<0.5	<1	<10
RI-48*	<1	<3	89.7	<1	<0.5	<3	<3	118	<3	R	<3	<4	<0.5	<1	<10
RI-730	<1	<3	116	<1	<0.5	<3	<3	219	<3	0.14	<3	<4	<0.5	<1	<10
SL-5477Z	<1	65.2	867	<1	<0.5	<3	<3	22,700	<3	<0.05	<3	<4	<0.5	<1	<10
SMN-33	<1	<3	642	<1	<0.5	<3	<3	2,010	<3	<0.05	<3	<4	<0.5	<1	<10
SMN-33*	<1	<3	647	<1	<0.5	<3	<3	2,020	<3	<0.05	<3	<4	<0.5	<1	<10
TS-60	<1	<3	755	<1	<0.5	<3	<3	8,850	<3	R	<3	<4	<0.5	<1	<10
TS-FORTENB	<1	14.4	379	<1	<0.5	<3	16.6	12,600	<3	R	<3	<4	<0.5	<1	198
WC-527	<1	<3	419	<1	<0.5	<3	<3	3,630	<3	0.05	<3	<4	<0.5	<1	<10
WC-91	<1	6.4	154	<1	<0.5	<3	<3	720	<3	0.07	<3	<4	<0.5	<1	<10

*Denotes Duplicate Sample. "R" = Data Rejected Exceeds EPA Primary Standard Exceeds EPA Secondary Standards

Table 4.1.8.

FY08 field and conventional statistics for ASSET wells sampled in the Mississippi River Alluvial aquifer.

	Parameter	Minimum	Maximum	Average
Field	Temperature (^{O}C)	18.66	23.91	20.40
	pH (SU)	6.66	8.52	7.22
	Specific Conductance (mmhos/cm)	0.198	2.228	0.890
	Salinity (ppt)	0.09	1.14	0.44
	TDS (g/L)	0.129	1.448	0.580
Conventional	Alkalinity (mg/L)	56.7	607	336.1
	Chloride (mg/L)	<10	110	40.6
	Color (PCU)	<5	50	10.5
	Specific Conductance (umhos/cm)	199	2,370	872
	Sulfate (mg/L)	<1.25	85.3	13.2
	TDS (mg/L)	160	1,314	521
	TSS (mg/L)	<4	56	14
	Turbidity (NTU)	<1	235	61
	Ammonia, as N (mg/L)	<0.1	5.98	0.85
	Hardness (mg/L)	78.1	511	341.6
	Nitrite - Nitrate, as N (mg/L)	<0.05	1.44	0.11
	TKN (mg/L)	<0.1	2.11	0.68
	Total Phosphorus (mg/L)	<0.05	1.08	0.43

Table 4.1.9.

FY08 inorganic (Total Metals) statistics for ASSET wells sampled in the Mississippi River Alluvial aquifer.

Parameter	Minimum	Maximum	Average
Antimony (ug/L)	<1	<1	<1
Arsenic (ug/L)	<3	65.2	9.54
Barium (ug/L)	33.6	867.0	403.9
Beryllium (ug/L)	<1	<1	<1
Cadmium (ug/L)	<0.5	<0.5	<0.5
Chromium (ug/L)	<3	3.9	<3
Copper (ug/L)	<3	16.6	<3
Iron (ug/L)	<20	22,700	5,985
Lead (ug/L)	<3	<3	<3
Mercury (ug/L)	<0.05	0.14	<0.05
Nickel (ug/L)	<3	<3	<3
Selenium (ug/L)	<4	<4	<4
Silver (ug/L)	<0.5	<0.5	<0.5
Thallium (ug/L)	<1	<1	<1
Zinc (ug/L)	<10	260	28

Table 4.1.10.

Field and conventional data averages for the three-year sampling cycles of the Mississippi River Alluvial Aquifer.

	Parameter	FY 1996 Average	FY 1999 Average	FY 2002 Average	FY 2005 Average	FY 2008 Average
Field	Temperature (^{O}C)	19.09	20.60	20.13	19.62	20.40
	pH (SU)	6.70	6.63	6.91	6.98	7.22
	Specific Conductance (mmhos/cm)	0.76	0.79	0.81	0.80	0.890
	Salinity (ppt)	0.35	0.39	0.41	0.40	0.44
	TDS (g/L)	-	-	-	0.52	0.58
Conventional	Alkalinity (mg/L)	306.01	328.69	316.11	347.16	336.1
	Chloride (mg/L)	68.19	55.18	44.81	48.64	40.6
	Color (PCU)	26.00	16.10	47.66	37.98	10.5
	Specific Conductance (umhos/cm)	768.60	804.12	769.41	766.21	872
	Sulfate (mg/L)	7.66	25.17	24.75	22.46	13.2
	TDS (mg/L)	674.32	494.88	481.66	488.96	521
	TSS (mg/L)	18.75	15.36	12.46	16.42	14
	Turbidity (NTU)	46.32	62.12	57.86	75.25	61
	Ammonia, as N (mg/L)	1.26	1.00	0.95	1.10	0.85
	Hardness (mg/L)	299.70	309.65	304.13	297.50	341.6
	Nitrite - Nitrate , as N (mg/L)	0.31	0.29	0.72	0.19	0.11
	TKN (mg/L)	1.34	1.43	1.27	1.36	0.68
	Total Phosphorus (mg/L)	0.49	0.54	0.54	0.59	0.43

Table 4.1.11.

Inorganic (Total Metals) data averages for the three-year sampling cycles of the Mississippi River Alluvial Aquifer.

Parameter	FY 1996 Average	FY 1999 Average	FY 2002 Average	FY 2005 Average	FY 2008 Average
Antimony (µg/L)	<5	<5	<5	<60	<1
Arsenic (µg/L)	12.68	14.55	9.21	14.31	9.54
Barium (µg/L)	473.5	412.3	403.9	524.5	403.9
Beryllium (µg/L)	<5	<5	<5	<5	<1
Cadmium (µg/L)	<5	<5	<5	<5	<0.5
Chromium (µg/L)	<5	<5	<5	<10	<3
Copper (µg/L)	9.86	8.55	6.18	<10	<3
Iron (µg/L)	5,022	4,690	6,008	8,726	5,985
Lead (µg/L)	<10	<10	<10	<10	<3
Mercury (µg/L)	<0.05	<0.05	<0.05	<0.2	<0.05
Nickel (µg/L)	<5	<5	<5	<40	<3
Selenium (µg/L)	<5	<5	<5	<35	<4
Silver (µg/L)	<5	<5	<5	<10	<0.5
Thallium (µg/L)	<5	<5	<5	<5	<1
Zinc (µg/L)	43.5	177.2	48.3	29.6	28

Table 4.1.12.

LDEQ ASSET Program field parameters, conventional, and inorganic analytes with applicable USEPA National Primary (MCL) and Secondary (SMCL) Drinking Water Standards and Action Levels (AL).

	Parameter/Analyte	MCL Limit / Type	Unit
FIELD	Temperature (Temp)	-	Degrees C.
	pH	SMCL / $\geq$ 6.5, $\leq$ 8.5	SU
	Specific Conductance (Sp. Cond.)	-	mmhos/cm
	Salinity (Sal.)	-	ppt
	Total Dissolved Solids (TDS)	SMCL / 0.5	g/L
CONVENTIONALS	Alkalinity (Alk)	-	mg/L
	Chloride (Cl)	SMCL / 250	mg/L
	Color	SMCL / 15	PCU
	Specific Conductance (Sp. Cond.)	-	umhos/cm
	Sulfate (SO4)	SMCL / 250	mg/L
	Total Dissolved Solids (TDS)	SMCL / 500	mg/L
	Total Suspended Solids (TSS)	-	mg/L
	Turbidity (Turb)	*MCL / 1	NTU
	Ammonia (NH3)	-	mg/L
	Hardness (Hard)	-	mg/L
	Nitrite-Nitrate (NO2NO3)	MCL / 10	mg/L
	Total Kjeldahl Nitrogen (TKN)	-	mg/L
	Total Phosphorus (Tot. P)	-	mg/L
INORGANICS (TOTAL METALS)	Antimony	MCL / 6	ug/L
	Arsenic	MCL / 10	ug/L
	Barium	MCL / 2,000	ug/L
	Beryllium	MCL / 4	ug/L
	Cadmium	MCL / 5	ug/L
	Chromium	MCL / 100	ug/L
	Copper	AL / 1,300	ug/L
	Iron	SMCL / 300	ug/L
	Lead	AL / 15	ug/L
	Mercury	MCL / 2	ug/L
	Nickel	-	ug/L
	Selenium	MCL / 50	ug/L
	Silver	SMCL / 100	ug/L
	Thallium	MCL / 2	ug/L
	Zinc	SMCL / 5,000	ug/L

MCL = Primary Maximum Contaminant Level; SMCL = Secondary Maximum Contaminant Level; AL = Action Level

* Only applies to public water supply (PWS) systems with surface water source, or groundwater source under the direct influence of surface water. Louisiana Department of Health and Hospitals has determined that no PWS well falls in this category.

Table 4.1.13.

ASSET Program Volatile Organic Compounds analyte list with method and detection limits.

Compound	Method	Detection Limits (ug/L)
1,1-Dichloroethane	624	2
1,1- Dichloroethene	624	2
1,1,1-Trichloroethane	624	2
1,1,2- Trichloroethane	624	2
1,1,2,2-Tetrachloroethane	624	2
1,2-Dichlorobenzene	624	2
1,2-Dichloroethane	624	2
1,2-Dichloropropane	624	2
1,3- Dichlorobenzene	624	2
1,4-Dichlorobenzene	624	2
Benzene	624	2
Bromoform	624	2
Carbon Tetrachloride	624	2
Chlorobenzene	624	2
Dibromochloromethane	624	2
Chloroethane	624	2
trans-1,2-Dichloroethene	624	2
cis-1,3-Dichloropropene	624	2
Bromodichloromethane	624	2
Methylene Chloride	624	2
Ethyl Benzene	624	2
Bromomethane	624	2
Chloromethane	624	2
o-Xylene	624	2
Styrene	624	2
Methyl-t-Butyl Ether	624	2
Tetrachloroethene	624	2
Toluene	624	2
trans-1,3-Dichloropropene	624	2
Trichloroethene	624	2
Trichlorofluoromethane	624	2
Chloroform	624	2
Vinyl Chloride	624	2
m- & p-Xylenes	624	4

Table 4.1.14.

ASSET Program Semi-Volatile Organic Compounds analyte list with method and detection limits.

Compound	Method	Detection Limits (ug/L)
1,2-Dichlorobenzene	625	10
1,2,3-Trichlorobenzene	625	10
1,2,3,4-Tetrachlorobenzene	625	10
1,2,4-Trichlorobenzene	625	10
1,2,4,5-Tetrachlorobenzene	625	10
1,3-Dichlorobenzene	625	10
1,3,5-Trichlorobenzene	625	10
1,4-Dichlorobenzene	625	10
2-Chloronaphthalene	625	10
2-Chlorophenol	625	20
2-Methyl-4,6-dinitrophenol	625	20
2-Nitrophenol	625	20
2,4-Dichlorophenol	625	20
2,4-Dimethylphenol	625	20
2,4-Dinitrophenol	625	20
2,4-Dinitrotoluene	625	10
2,4,6-Trichlorophenol	625	20
2,6-Dinitrotoluene	625	10
3,3'-Dichlorobenzidine	625	10
4-Bromophenyl phenyl ether	625	10
4-Chloro-3-methylphenol	625	20
4-Chlorophenyl phenyl ether	625	10
4-Nitrophenol	625	20
Acenaphthene	625	10
Acenaphthylene	625	10
Anthracene	625	10
Benzidine	625	20
Benzo[a]pyrene	625	10
Benzo[k]fluoranthene	625	10
Benzo[a]anthracene	625	10
Benzo[b]fluoranthene	625	10
Benzo[g,h,i]perylene	625	10
Bis(2-chloroethoxy)methane	625	10
Bis(2-ethylhexyl)phthalate	625	10
Bis(2-chloroethyl)ether	625	10
Bis(2-chloroisopropyl)ether	625	10
Butylbenzylphthalate	625	10
Chrysene	625	10
Dibenzo[a,h]anthracene	625	10
Diethylphthalate	625	10
Dimethylphthalate	625	10

Table 4.1.14.

ASSET Program Semi-Volatile Organic Compounds analyte list with method and detection limits.

Compound	Method	Detection Limits (ug/L)
Di-n-butylphthalate	625	10
Di-n-octylphthalate	625	10
Fluoranthene	625	10
Fluorene	625	10
Hexachlorobenzene	625	10
Hexachlorobutadiene	625	10
Hexachlorocyclopentadiene	625	10
Hexachloroethane	625	10
Indeno[1,2,3-cd]pyrene	625	10
Isophorone	625	10
Naphthalene	625	10
Nitrobenzene	625	10
N-Nitrosodimethylamine	625	10
N-Nitrosodiphenylamine	625	10
N-nitroso-di-n-propylamine	625	10
Pentachlorobenzene	625	10
Pentachlorophenol	625	20
Phenanthrene	625	10
Phenol	625	20
Pyrene	625	10

Table 4.1.15.

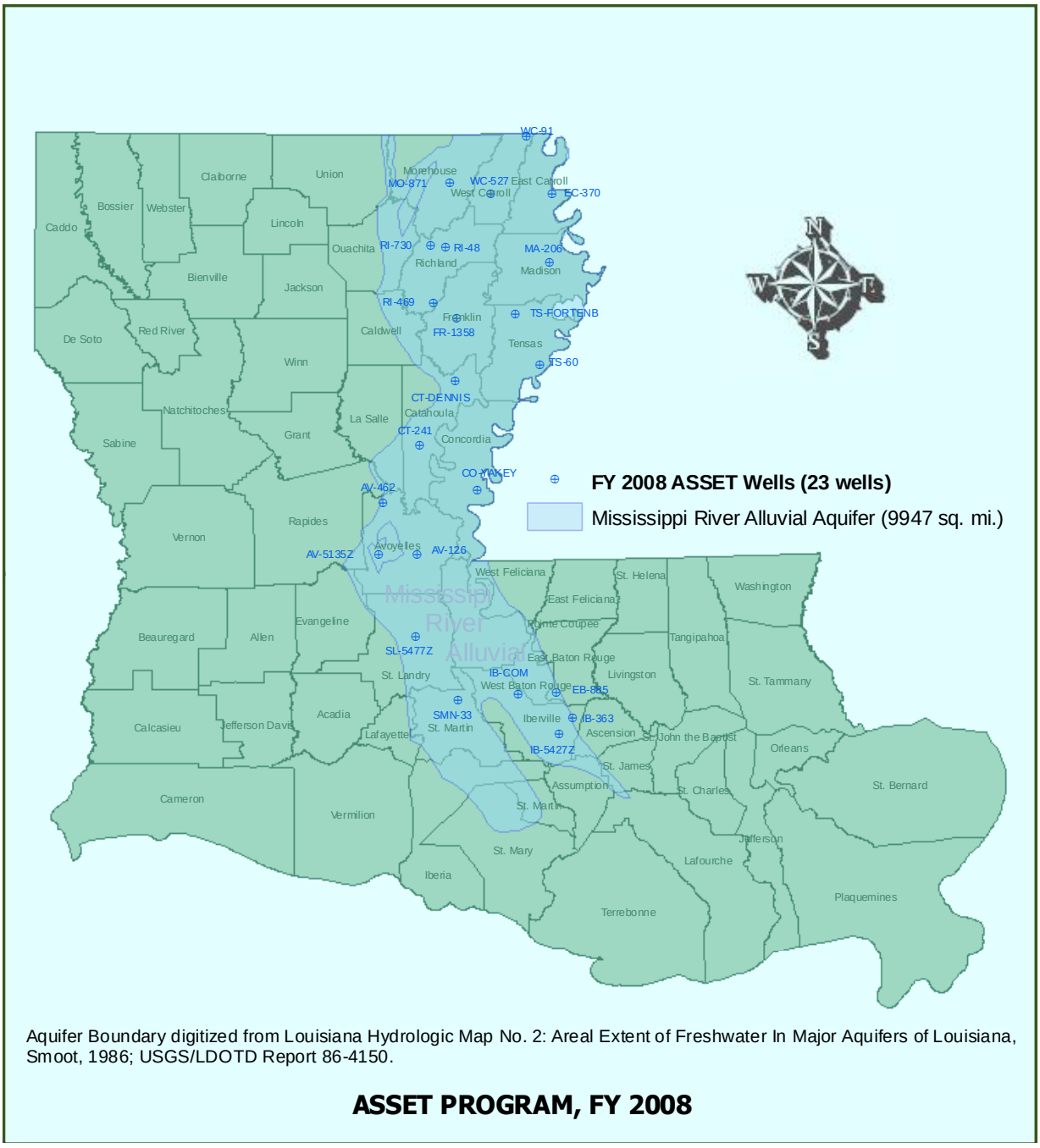
ASSET Program Pesticide and PCB analyte list with method and detection limits.

Compound	Method	Detection Limits* (ug/L)
4,4'-DDD	608	0.05/0.1
4,4'-DDE	608	0.05/0.1
4,4'-DDT	608	0.05/0.1
Aldrin	608	0.05
Alpha-Chlordane	608	0.05
alpha-BHC	608	0.05
beta-BHC	608	0.05
delta-BHC	608	0.05
gamma-BHC	608	0.05
Chlordane	608	0.2
Dieldrin	608	0.05/0.1
Endosulfan I	608	0.05
Endosulfan II	608	0.05/0.1
Endosulfan Sulfate	608	0.05/0.1
Endrin	608	0.05/0.1
Endrin Aldehyde	608	0.05/0.1
Endrin Ketone	608	0.05/0.1
Heptachlor	608	0.05
Heptachlor Epoxide	608	0.05
Methoxychlor	608	0.05/0.5
Toxaphene	608	2
Gamma-Chlordane	608	0.05
PCB-1016	608	1
PCB-1221	608	1
PCB-1232	608	1
PCB-1242	608	1
PCB-1248	608	1
PCB-1254	608	1
PCB-1260	608	1

*Multiple detection limits due to multiple labs performing analyses.

Figure 4.1.1.

Location Plat, Mississippi River Alluvial Aquifer



Aquifer Boundary digitized from Louisiana Hydrologic Map No. 2: Areal Extent of Freshwater In Major Aquifers of Louisiana, Smoot, 1986; USGS/LDOTD Report 86-4150.

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Figure 4.1.2.

Map of pH Data

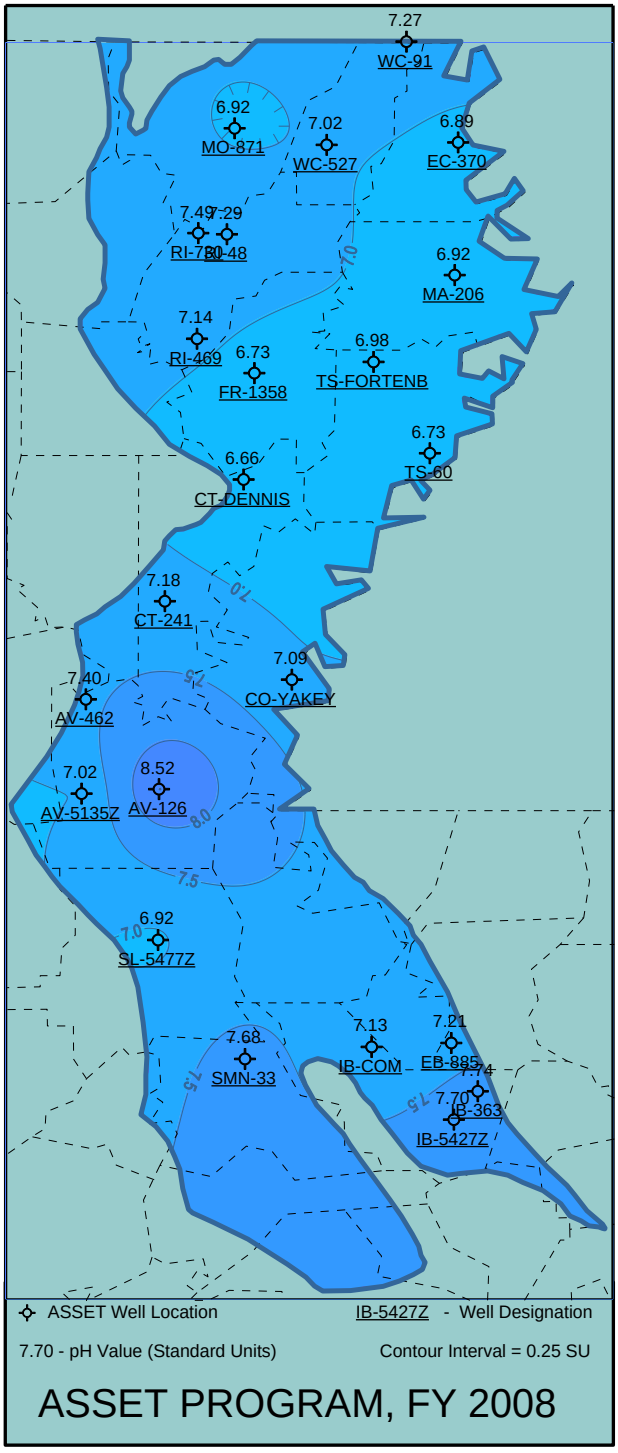


Figure 4.1.3.

Map of TDS Lab Data

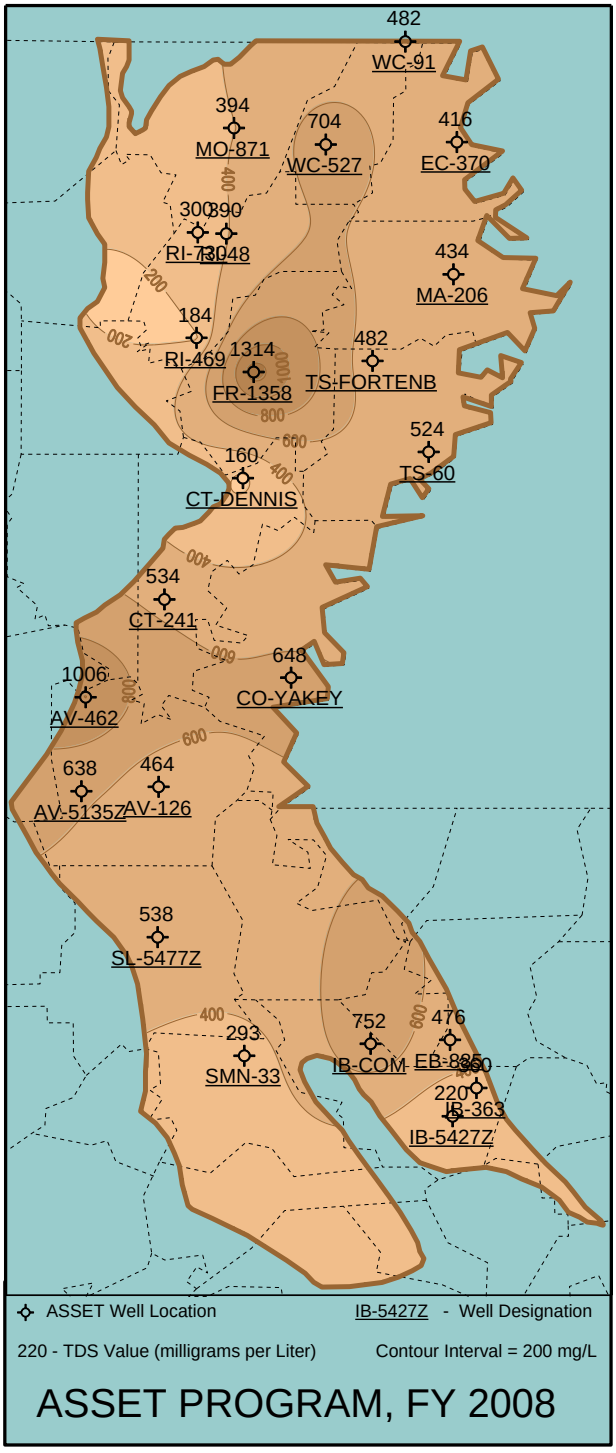


Figure 4.1.4.

Map of Chloride Data

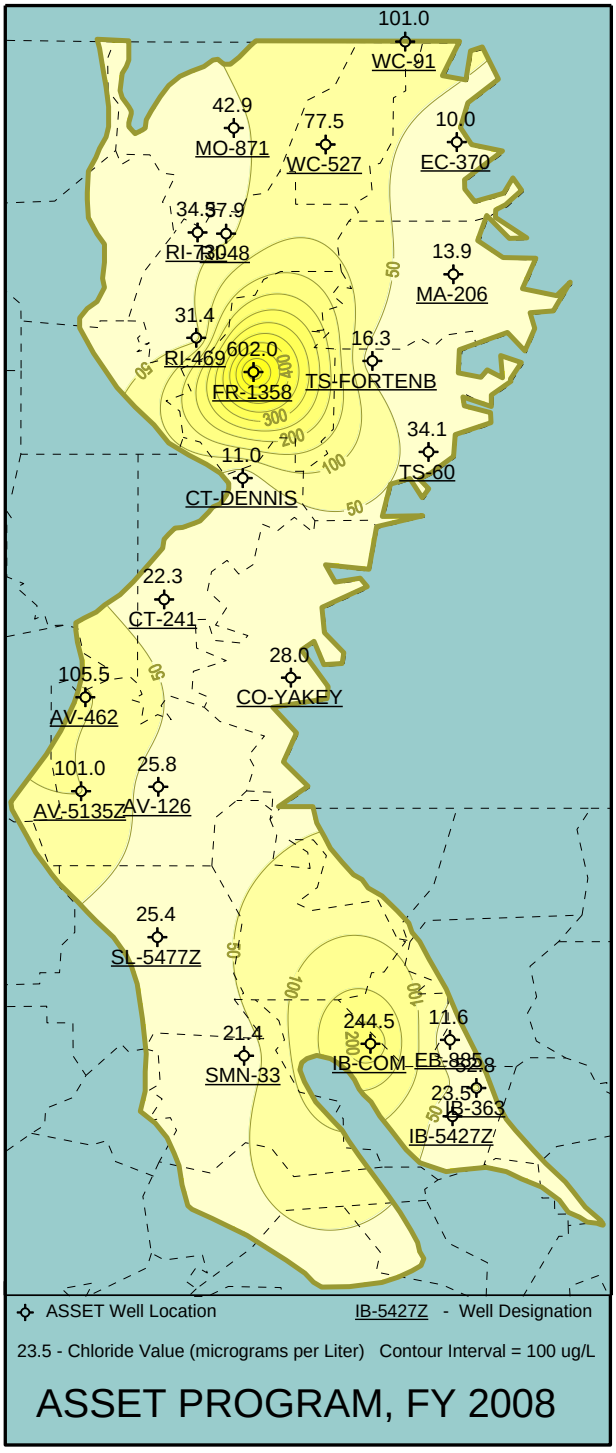


Figure 4.1.5.

Map of Iron Data

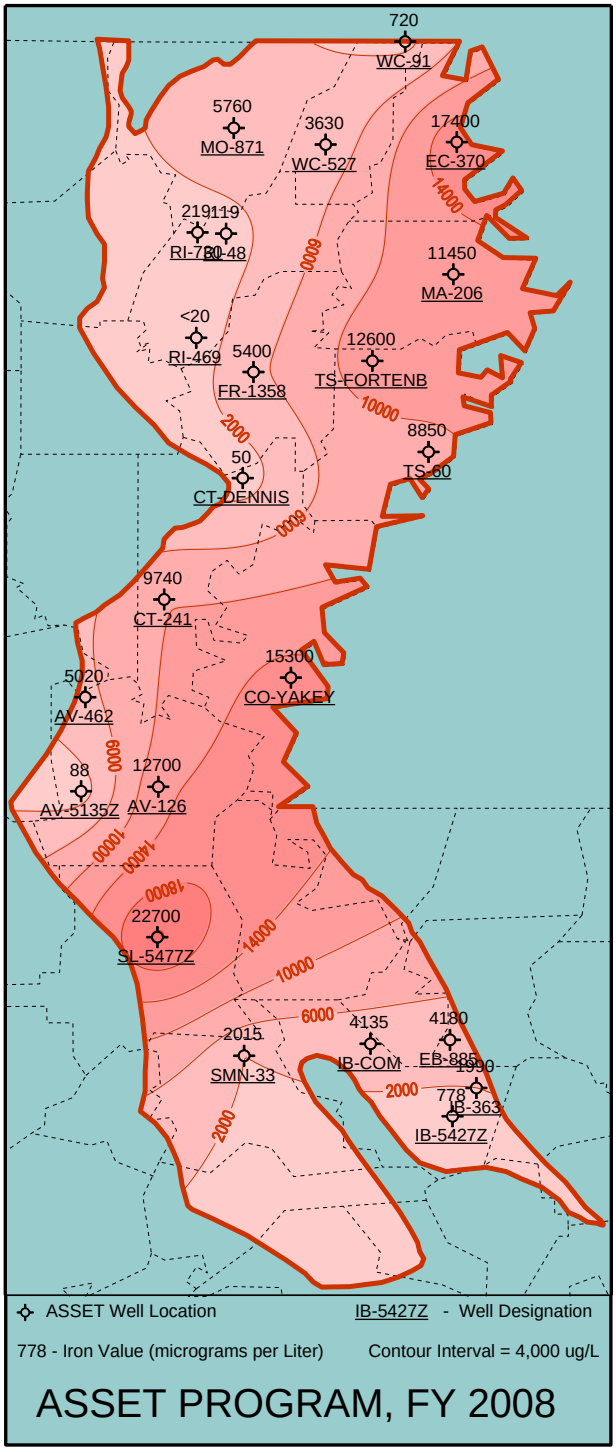


Figure 4.1.6.

Graph of temperature average for the three-year sampling cycles of the Mississippi River Alluvial Aquifer.

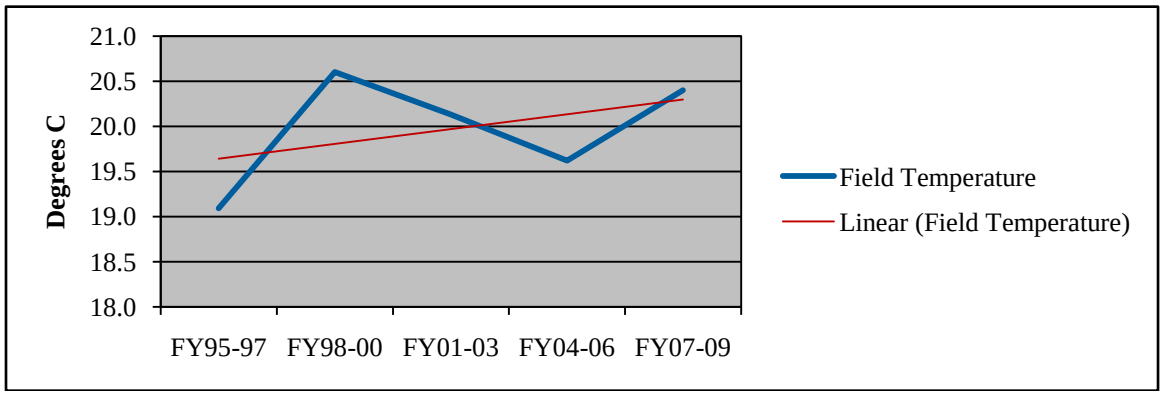


Figure 4.1.7.

Graph of pH average for the three-year sampling cycles of the Mississippi River Alluvial Aquifer.

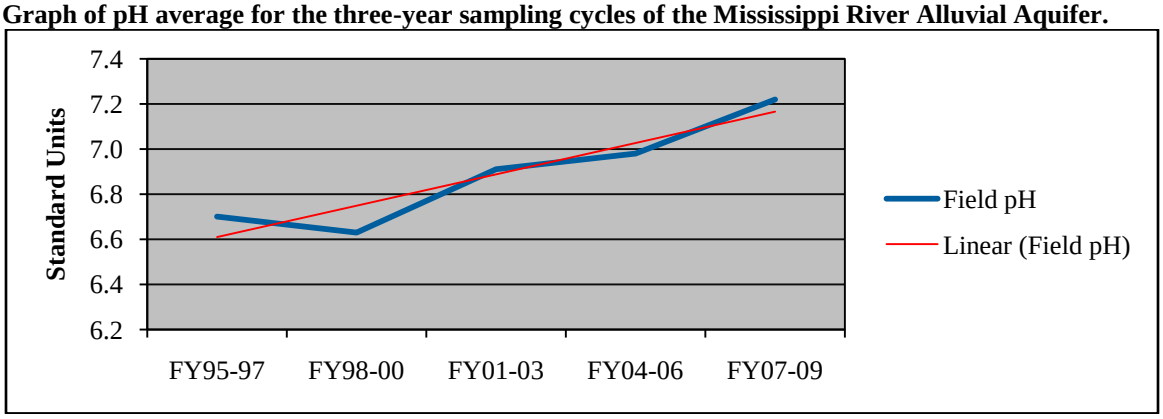


Figure 4.1.8.

Graph of field measured specific conductance average for the three-year sampling cycles of the Mississippi River Alluvial Aquifer.

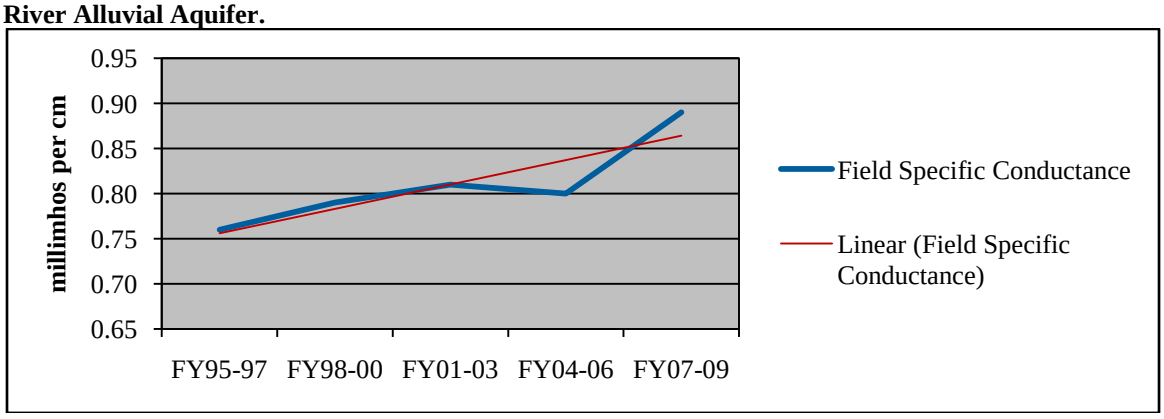


Figure 4.1.9.

Graph of lab derived specific conductance average for the three-year sampling cycles of the Mississippi River Alluvial Aquifer.

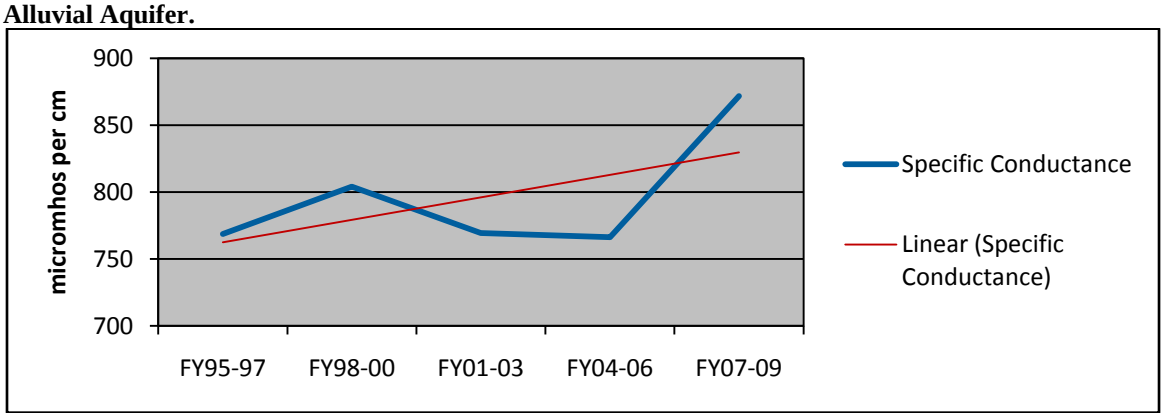


Figure 4.1.10.

Graph of field measured salinity average for the three-year sampling cycles of the Mississippi River Alluvial Aquifer.

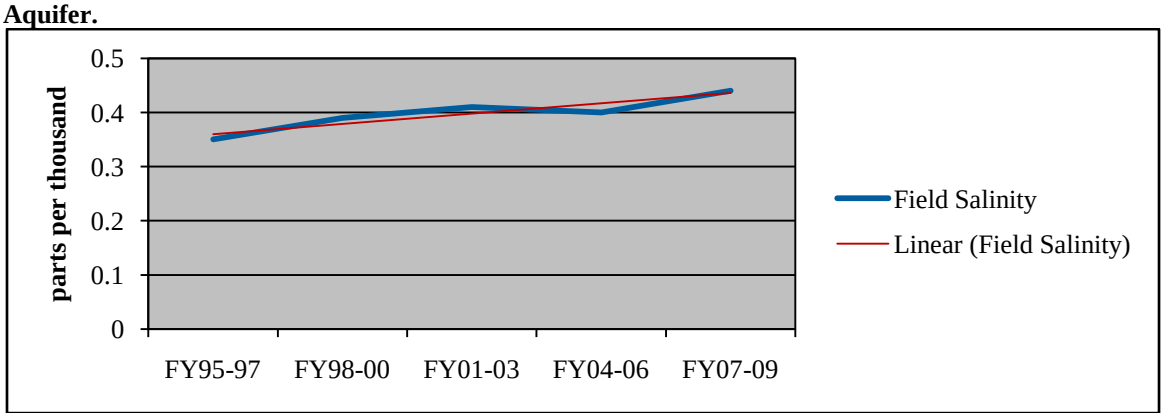


Figure 4.1.11.

Graph of alkalinity average for the three-year sampling cycles of the Mississippi River Alluvial Aquifer.

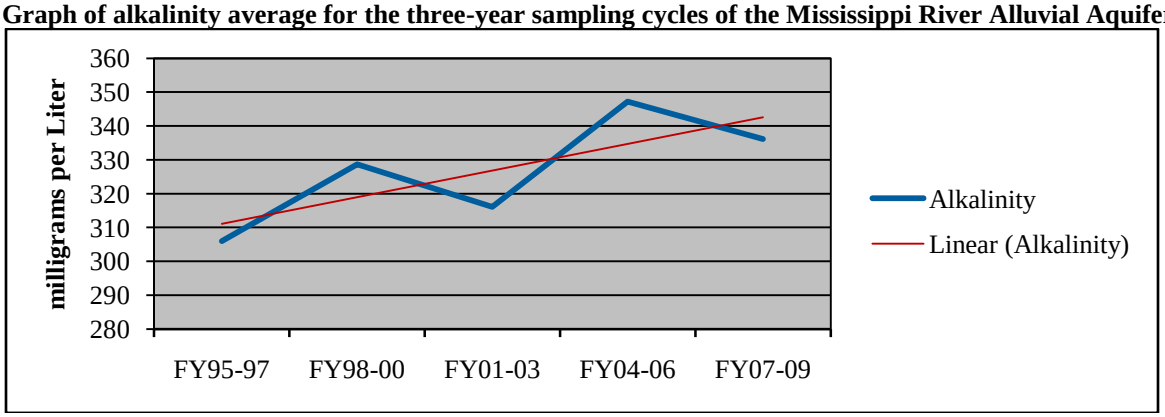


Figure 4.1.12.

Graph of chloride average for the three-year sampling cycles of the Mississippi River Alluvial Aquifer.

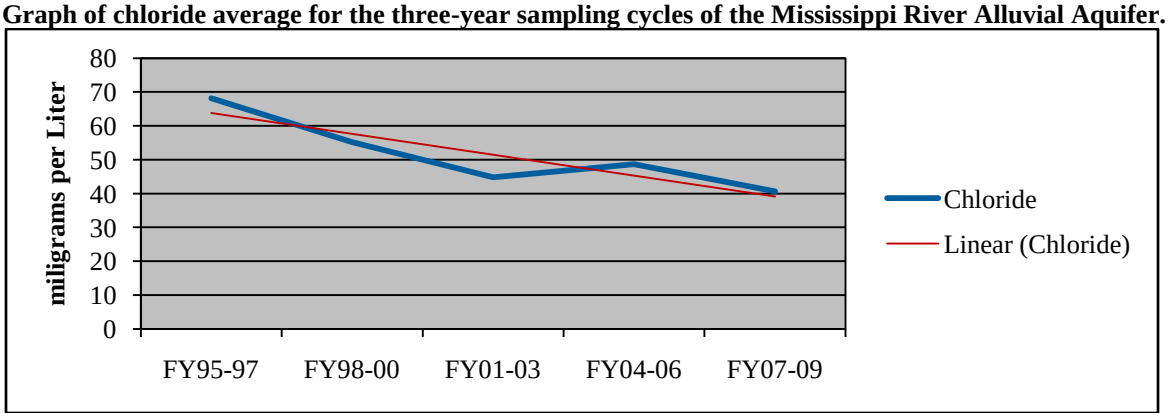


Figure 4.1.13.

Graph of color average for the three-year sampling cycles of the Mississippi River Alluvial Aquifer.

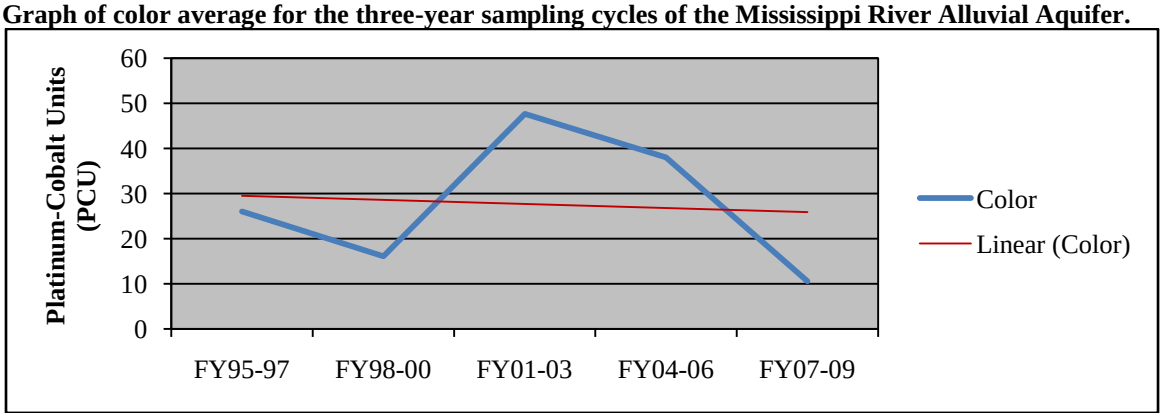


Figure 4.1.14.

Graph of sulfate average for the three-year sampling cycles of the Mississippi River Alluvial Aquifer.

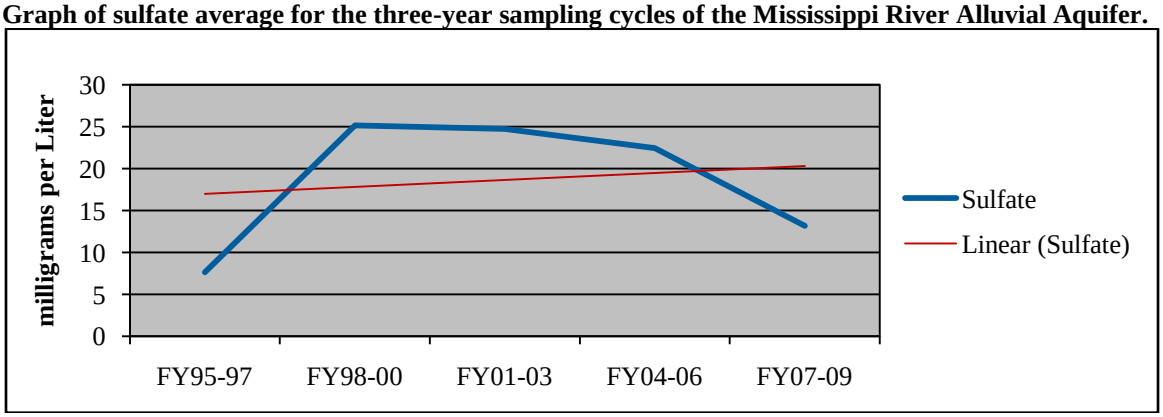


Figure 4.1.15.

Graph of laboratory-derived total dissolved solids average for the three-year sampling cycles of the Mississippi River Alluvial Aquifer.

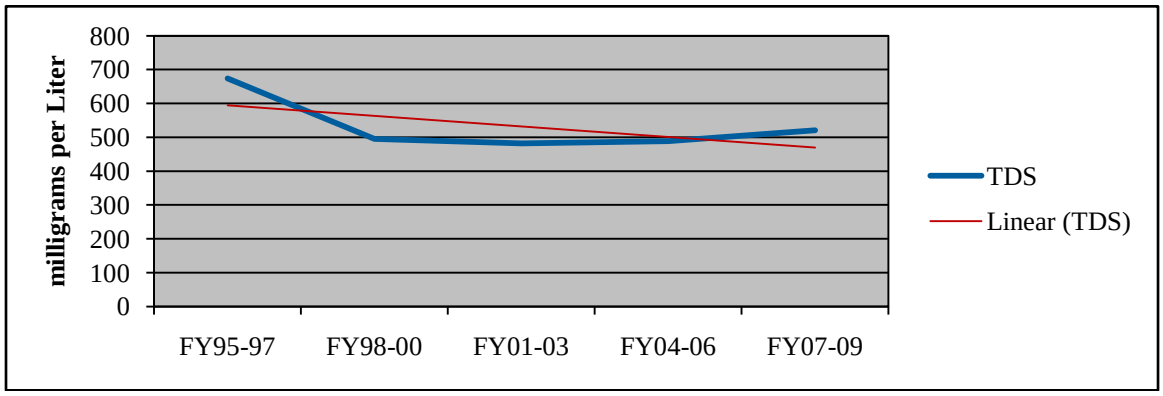


Figure 4.1.16.

Graph of ammonia average for the three-year sampling cycles of the Mississippi River Alluvial Aquifer.

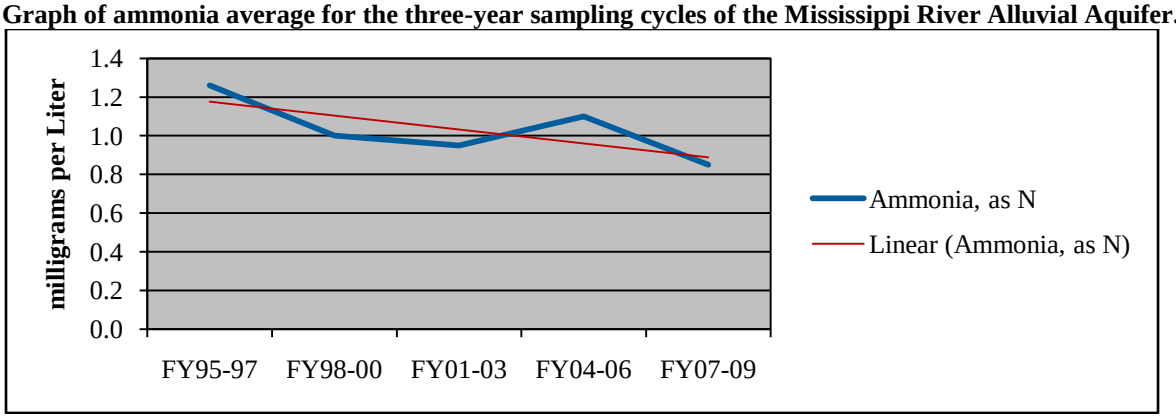


Figure 4.1.17.

Graph of hardness average for the three-year sampling cycles of the Mississippi River Alluvial Aquifer.

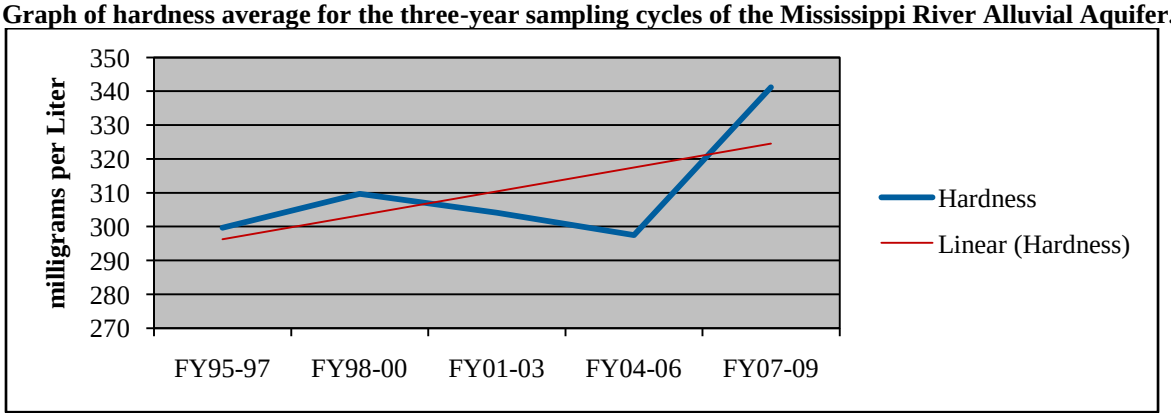


Figure 4.1.18.

Graph of nitrite/nitrate average for the three-year sampling cycles of the Mississippi River Alluvial Aquifer.

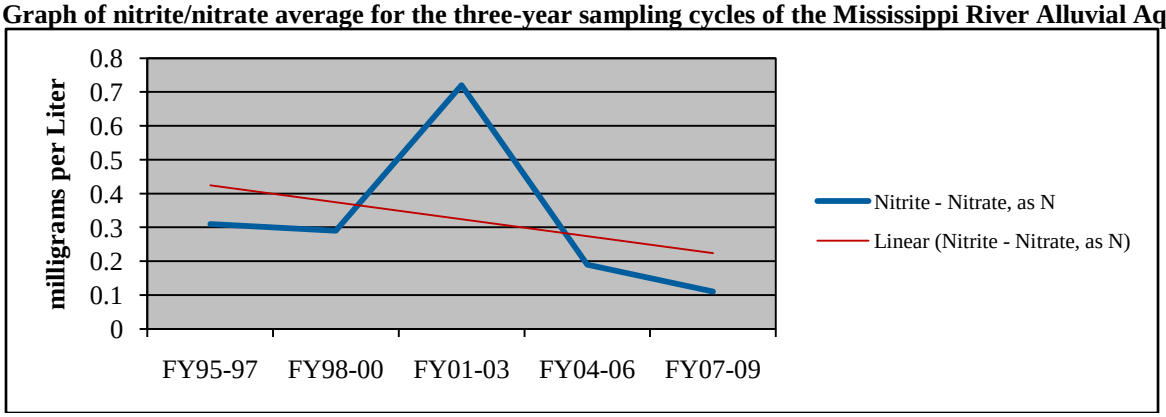


Figure 4.1.19.

Graph of total Kjeldahl nitrogen (TKN) average for the three-year sampling cycles of the Mississippi River Alluvial Aquifer.

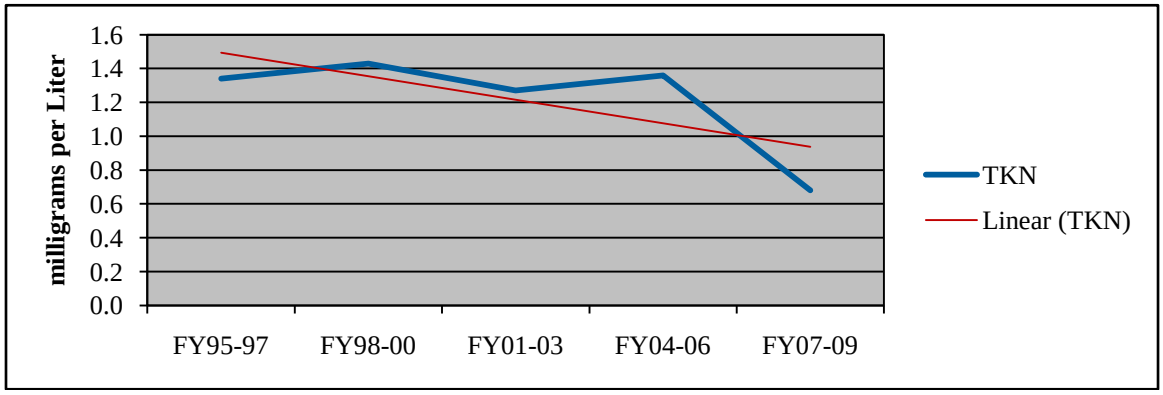


Figure 4.1.20.

Graph of total phosphorus average for the three-year sampling cycles of the Mississippi River Alluvial Aquifer.

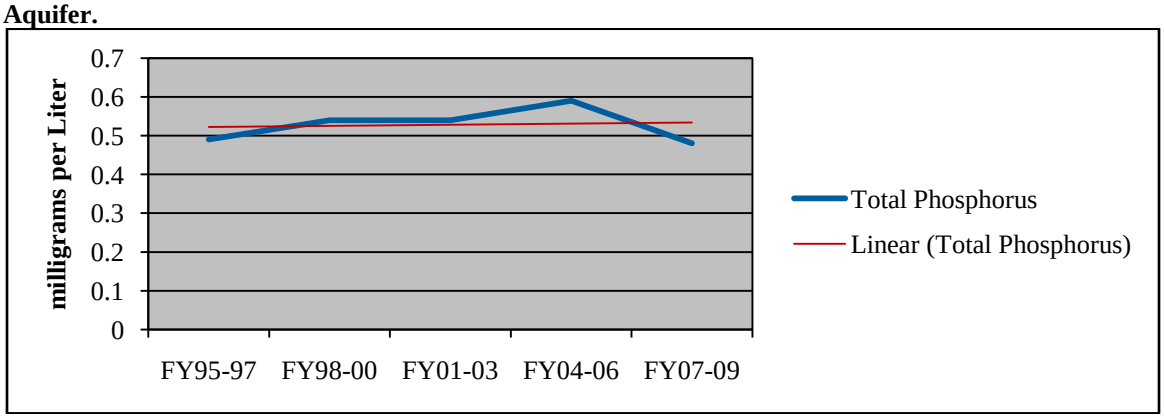
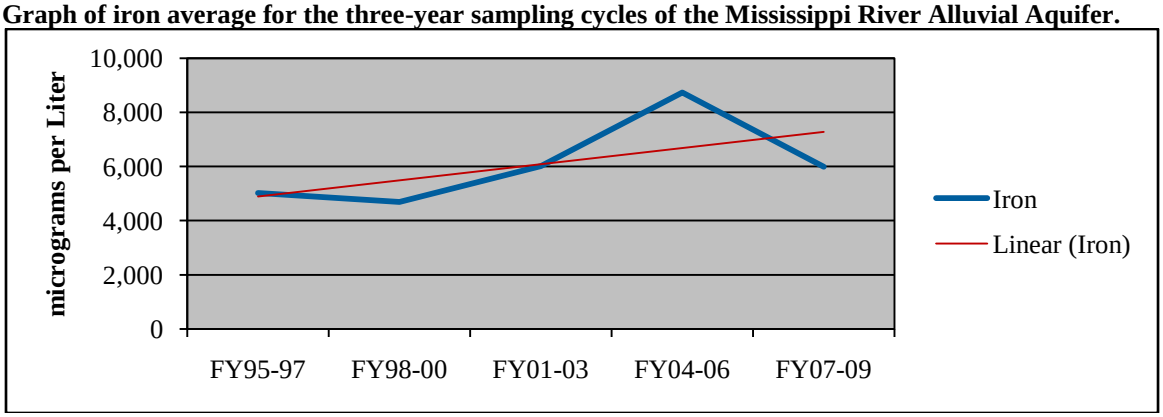


Figure 4.1.21.

Graph of iron average for the three-year sampling cycles of the Mississippi River Alluvial Aquifer.



GLOSSARY

Agriculture – Agriculture involves the use of water for crop spraying, irrigation, livestock watering, poultry operations and other farm purposes not related to human consumption.

Clean technique metals analysis – an integrated system of sample collection and laboratory analytical procedures designed to detect concentrations of trace metals below criteria levels and eliminate or minimize inadvertent sample contamination that can occur during traditional sampling practices.

Degree of support – The level at which water quality supports the designated uses of a water body specified in the Louisiana Water Quality Standards. The degree of support is divided into three levels: fully supporting uses, partially supporting uses, and not supporting uses.

Designated water use – A use of the waters of the state as established by the Louisiana Water Quality Standards. These uses include, but are not limited to, recreation, propagation of fish and other aquatic life and wildlife including oysters, public water supply, agricultural activities, and outstanding natural resource waters.

Dissolved oxygen – The amount of oxygen dissolved in water, commonly expressed as a concentration in terms of milligrams per liter, mg/l.

Drinking water supply – A surface or underground raw water source which, after conventional treatment, will provide safe, clear, potable and aesthetically pleasing water for uses which include but are not limited to, human consumption, food processing and cooking, and as a liquid ingredient in foods and beverages.

Effluent – Wastewater discharged to waters of the state.

Effluent limitation – Any applicable state or federal quality or quantity limitation which imposes any restriction or prohibition on quantities, discharge rates and concentrations of pollutants which are discharged into waters of the state.

Effluent-limited segment – Any stream segment where water quality is meeting and will continue to meet applicable water quality standards or where there is adequate demonstration that water quality will meet applicable standards after the application of effluent limitations required by the Clean Water Act, as amended.

Evaluated waters – Water bodies for which assessment is based on information other than current site-specific ambient data, such as data on land use, location of pollutant sources, fisheries surveys, fish kill investigations, spill investigations, and citizen complaints.

Existing use – Those uses actually attained in the water body on or after November 28, 1975. They may or may not be designated uses.

Fecal coliform – Gram negative, non-spore forming, rod-shaped bacteria found in the intestinal tracts of warm-blooded animals.

Fish and wildlife propagation – Fish and wildlife propagation includes the use of water for preservation and reproduction of aquatic biota such as indigenous species of fish and invertebrates, as well as reptiles, amphibians, and other wildlife associated with the aquatic environment. This use also includes the maintenance of water quality at a level that prevents contamination of aquatic biota consumed by humans.

Limited Aquatic Life and Wildlife – A subcategory of fish and wildlife propagation that recognizes not all water bodies are capable of supporting the same level of species diversity and richness. Examples of water bodies to which this may be applied include intermittent streams and man-made water bodies that lack suitable riparian structure and habitat.

Monitored waters – Water bodies for which assessment is based on current site-specific ambient data.

Naturally dystrophic waters – Waters which are stained with organic material and which are low in dissolved oxygen due to natural conditions.

Nonpoint source – A diffuse source of water pollution that does not discharge through a point source or pipe, but instead flows freely across exposed natural or man-made surfaces, such as plowed fields, pasture land, construction sites, and parking lots.

Outstanding natural resource waters – Outstanding and natural resource waters include water bodies designated for preservation, protection, reclamation, or enhancement of wilderness and aesthetic qualities and ecological

regimes, such as those designated under the Louisiana Natural and Scenic Rivers System or those designated by the Office of Environmental Compliance as waters of ecological significance. This use designation applies only to the water bodies specifically identified in Louisiana's numerical criteria, ERC 33:IX.1123, table 3, and not to their tributaries or distributaries, unless so specified.

Oxygen-demanding substances – Organic matter or materials in water or wastewater which utilize oxygen during the decomposition process, and inorganic material, such as sulfides, which utilize oxygen during the oxidation process.

Oyster propagation – The use of water to maintain biological systems that support economically important species of oysters, clams, mussels, or other mollusks so that their productivity is preserved and the health of human consumers of these species is protected. This use shall apply only to those water bodies named in the numerical criteria tables and not to their tributaries or distributaries unless so specified.

Point source – A discernible, confined and discrete conveyance including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, vessel or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture.

Potentiometric surface – An imaginary surface representing the total head of ground water in a confined aquifer that is defined by the level to which water will rise in a well.

Primary contact recreation – Any recreational activity which involves or requires prolonged body contact with the water, such as swimming, water skiing, tubing, snorkeling, and skin-diving.

Riparian – Area of land along the banks of a stream which often exhibits slightly different vegetation and habitats than the surrounding landscape. Because of this variation, riparian areas are considered valuable wildlife habitat and important for the protection of water quality.

Subsegment – A named regulatory water body as defined by ERC 33:IX.1123. They are considered representative of the watershed through which they flow and, therefore, have numerical criteria assigned to them. This is the level of watersheds at which §305(b) assessments are applied. Each subsegment has a six digit number assigned in the following manner, 03=basin, 01=segment, 01=subsegment. This would be read as 030101, which represents Calcasieu River-headwaters to Highway 8. For mapping purposes, the subsegment is defined as a polygonal geographical area using GIS (Geographic Information System).

Secondary contact recreation – Any recreational activity which may involve incidental or accidental body contact with the water and during which the probability of ingesting appreciable quantities of water is minimal, such as fishing, wading, and recreational boating.

Toxic substances – Any element, compound or mixture which at sufficient exposure levels induces deleterious acute or chronic physiological effects on an organism.

Wastewater – Liquid waste resulting from commercial, municipal, private, or industrial processes. This includes but is not limited to, cooling and condensing waters, sanitary sewage, industrial waste, and contaminated rainwater runoff.

Water body – Any contiguous body of water identified by the state. A water body can be a stream, a river, a segment of a stream or river, a lake, a bay, a series of bays, or a watershed.

Water quality-limited segment – Any stream segment where the stream does not meet applicable water quality standards or will not meet applicable water quality standards even after application of the effluent limitations required by the Clean Water Act, as amended.

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APPENDIX A: 2010 Integrated Report of Water Quality in Louisiana

Appendix A is taken from Louisiana's 2010 Assessment Database (ADB), which contains all water quality assessments for the state. All suspected causes of impairment and suspected sources of impairment are linked in a one to one fashion, meaning, a given suspected cause of impairment is believed to be affected by the suspected source of impairment provided on the same line of the table. However, as a result of this linking, some suspected causes and/or sources may be listed more than once for a given water body subsegment. This results in cases where a suspected cause of impairment has two or more suspected sources of impairment. Likewise, if a suspected source of impairment affects two or more suspected causes of impairment, the suspected source will be listed more than once. This is important to note in order to prevent double counting when attempting to develop subtotals for the size or number of water bodies affected by a given suspected cause or suspected source of impairment.

The full water quality assessment table is contained in Appendix A at: 10_IR1-FINAL-Appendix_A-All Assessments.

Assessment Table Header Information

Type = water body type

R = river

L = lake

E = estuary

W = wetland

Designated Uses and Codes:

PCR = primary contact recreation (swimming)

SCR = secondary contact recreation (boating)

FWP = fish and wildlife propagation

DWS = drinking water supply

ONR = outstanding natural resource waters

AGR = agriculture

OYS = oyster propagation

LAL = FWP subcategory of limited aquatic life and wildlife

IR Category and TMDL Codes:

IR Category for Suspected Causes = Integrated Report Category. See Part III, Chapter 2 for details of these categories.

TMDL Due Date = year in which TMDL is due according to U.S. EPA's Consent Decree schedule or LDEQ schedules beyond the Consent Decree for newly listed water body subsegments.

TMDL Priority = priority order in which TMDLs will be developed, based on U.S. EPA's Consent Decree schedule and addition of newly listed water body subsegments.

Designated Use Support Statements

Designated uses are assessed as either fully supporting or not supporting the use based on water quality assessment procedures described in Part III, Chapter 2 of this report. In some cases insufficient data or no data are available

with which to make an assessment. Where a designated use exists for a water body subsegment, letters are used in that column to indicate the 2010 assessment of that use. These letters are defined as follows:

F = Fully supporting the designated use
N = Not supporting the designated use
I = Insufficient data to make an assessment
X = No data with which to make an assessment

Descriptions of Louisiana's Watershed Basins

For water quality management purposes, Louisiana is divided into twelve large-scale watershed basins. These basins are based on eleven river watersheds plus the Lake Pontchartrain watershed. Also for management purposes, these basins were assigned numbers for use in watershed segment and subsegment delineation. These subsegments are described in more detail in Part II, Chapter 2 of this report. The twelve basins and their associated numbers are:

Atchafalaya River Basin (01)
Barataria Basin (02)
Calcasieu River Basin (03)
Lake Pontchartrain Basin (04)
Mermentau River Basin (05)
Vermilion-Teche Basin (06)
Mississippi River Basin (07)
Ouachita River Basin (08)
Pearl River Basin (09)
Red River Basin (10)
Sabine River Basin (11)
Terrebonne Basin (12)

Descriptions of each of these twelve basins follow:

ATCHAFALAYA RIVER BASIN (01)

The Atchafalaya River Basin is located in the south central part of Louisiana. The Atchafalaya River is a distributary of the Red, Black, and Mississippi Rivers, presently carrying about 30 percent of the Mississippi's flow. The basin is well-defined by a system of levees, which surround it on the north, east, and west. The entire basin serves as a major floodway for Mississippi River floodwaters. It encompasses approximately 1,806 square miles. The Atchafalaya Basin is predominantly wooded lowland and cypress-tupelo swamp with some fresh water marshes in the lower distributary area. It constitutes the largest contiguous fresh water swamp in the United States.

BARATARIA BASIN (02)

The Barataria Basin lies in the eastern coastal region of the state. This basin is bounded on the north and east by the lower Mississippi River, on the west by Bayou Lafourche, and on the south by the Gulf of Mexico. The major receiving water body in this basin is Barataria Bay. The Barataria Basin consists largely of wooded lowlands and fresh to brackish marshes, having some saline marsh on the fringes of Barataria Bay. Elevations in this basin range from minus two feet to four feet above sea level.

CALCASIEU RIVER BASIN (03)

The Calcasieu River Basin is located in southwestern Louisiana and is positioned in a north-south direction. The drainage area of the Calcasieu Basin comprises approximately 3,910 square miles. Headwaters of the Calcasieu River are in the hills west of Alexandria. The river flows south for about 160 miles to the Gulf of Mexico. The mouth of the river is about 30 miles east of the Texas-Louisiana state line. The landscape in this basin varies from pine-forested hills in the upper end to brackish and salt marshes in the lower reach around Calcasieu Lake.

LAKE PONTCHARTRAIN BASIN (04)

The Lake Pontchartrain Basin, located in southeastern Louisiana, consists of the tributaries and distributaries of Lake Pontchartrain, a large estuarine lake. The basin is bounded on the north by the Mississippi state line, on the west and south by the east bank Mississippi River levee, on the east by the Pearl River Basin, and on the southeast by Breton and Chandeleur Sounds. This basin includes Lake Borgne, Breton Sound, Chandeleur Sound, and the

Chandeleur Islands. The northern part of the basin consists of wooded uplands, both pine and hardwood forests. The southern portions of the basin consist of cypress-tupelo swamps and lowlands and brackish and saline marshes. The marshes of the southeastern part of the basin constitute the most rapidly eroding area along the Louisiana coast. Elevations in this basin range from minus five feet at New Orleans to over two hundred feet near the Mississippi border.

MERMENTAU RIVER BASIN (05)

The Mermentau River Basin is located in southwestern Louisiana and encompasses the prairie region of the state and a section of the coastal zone. The Mermentau River Basin is bounded on the north and east by the Vermilion-Teche Basin, on the west by the Calcasieu River Basin, and on the south by the Gulf of Mexico.

VERMILION-TECHE BASIN (06)

The Vermilion-Teche River Basin lies in south central Louisiana. The upper end of the basin lies in the central part of the state near Alexandria, and the basin extends southward to the Gulf of Mexico. The basin is bordered on the north and northeast by a low escarpment and the lower end of the Red River Basin. The Atchafalaya River Basin is to the east, and the Mermentau River Basin is to the west.

MISSISSIPPI RIVER BASIN (07)

The upper Mississippi River, which flows south, forms the boundary between Louisiana and Mississippi. The lower Mississippi River flows southeasterly through the southeast section of Louisiana. The upper stretch of the Mississippi does not get any tributary flow from the Louisiana side, which is leveed. Tributaries do enter from Mississippi, including the Yazoo River, the Black River, the Homochitto River, the Buffalo River, and Bayou Pierre. The stretch of the Mississippi River between the Old River Control Structure and Baton Rouge does receive tributary flow from Thompson's Creek, Bayou Sara, Tunica Bayou, and Monte Sano Bayou. The river is leveed on both the east and west banks from Baton Rouge below Monte Sano Bayou to Venice. This stretch of the river is also heavily industrialized, receiving numerous industrial discharges from Baton Rouge to New Orleans. The birdfoot delta of the Mississippi, where it flows into the Gulf, consists of fresh and intermediate marshes.

OUACHITA RIVER BASIN (08)

The Ouachita River's source is found in the Ouachita Mountains of west central Arkansas near the Oklahoma border. The Ouachita River flows south through northeastern Louisiana and joins with the Tensas River to form the Black River, which empties into the Red River. The Ouachita Basin covers over 10,000 square miles of drainage area. Most of the basin consists of rich, alluvial plains cultivated in cotton and soybeans. The northwest corner of the basin is forested in pine, which is commercially harvested.

PEARL RIVER BASIN (09)

The Pearl River Basin lies along the southeastern Louisiana – southwestern Mississippi Border. This basin is bordered on the north by the Mississippi state line and on the west and south by the Lake Pontchartrain basin. Elevations in the basin range from 350 feet above mean sea level in the northwest portions to sea level at the southern end. Correspondingly, the vegetation varies from pine forests to brackish marsh.

RED RIVER BASIN (10)

The Red River has its origin in eastern New Mexico and flows across portions of Texas, Oklahoma and Arkansas before entering northwestern Louisiana. The river flows south to Shreveport, where it turns southeast and flows for approximately 160 miles to its junction with the Atchafalaya River. From the Arkansas state line to Alexandria, the Red River is contained within high banks, which range from 20 to 35 feet above low water level. Below Alexandria, the river flows through a flat alluvial plain, which is subject to backwater flooding during periods of high water. The Sabine River Basin lies to the southwest of the Red River Basin, and the Ouachita River Basin lies to the east. The Calcasieu, Vermilion-Teche, and Atchafalaya River Basins lie south of the Red River Basin. The Red River drains approximately 7,760 square miles within Louisiana.

SABINE RIVER BASIN (11)

The Sabine River Basin lies along the Texas-Louisiana border, encompassing more than 2,900 square miles of drainage area within Louisiana. The basin stretches from the Texas state line near Shreveport to the Gulf of Mexico. It is bounded on the east by the Red River Basin and Calcasieu River Basin. Characteristic vegetation ranges from mixed forests in the upper basin to hardwoods in the mid-section and brackish and saline marshes in the lower end.

TERREBONNE BASIN (12)

The Terrebonne Basin covers an area extending approximately 120 miles from the Mississippi River on the north to the Gulf of Mexico on the south. It varies in width from 18 miles to 70 miles. This basin is bounded on the west by the Atchafalaya River Basin and on the east by the Mississippi River and Bayou Lafourche. The topography of the entire basin is lowland, and all the land is subject to flooding except the natural levees along major waterways. The coastal portion of the basin is prone to tidal flooding and consists of marshes ranging from fresh to saline.

APPENDIX B: 2010 Integrated Report of Water Quality in Louisiana – Addendum

Appendix B contains 2010 Integrated Report information that could not be included in the original source Assessment Database (ADB). These items could not be included in ADB because they are "generic" listings of suspected impairments such as "pesticides" and "priority organics." These generic listings are a legacy of assessments known as evaluative assessments and are in most cases not based on chemical data. The Louisiana Department of Environmental Quality (LDEQ) is attempting to determine what specific chemicals were being considered when these generic evaluative assessment listings were originally made. As LDEQ determines what specific chemical was originally intended, that chemical will be included in the ADB. Likewise, if the specific chemical or class of chemicals originally intended is not found to be causing an impairment of water quality, the associated generic listing in this addendum will be removed.

The full addendum table is contained in Appendix B at: 10 IR1-FINAL-Appendix B-Addendum.

APPENDIX C: 2010 Integrated Report of Water Quality in Louisiana – Category 1 Addendum

Appendix C, the 2010 Integrated Report, Category 1 Addendum, contains those water body impairment combinations (WICs) that have been removed from USEPA's Consent Decree §303(d) List because the suspected cause is no longer considered to be impairing water quality of the water body subsegment. Removal may be based on more recent water quality data collected after development of the Consent Decree §303(d) List, or due to advances in water quality assessment that permit more accurate determinations of water quality. This information is included for Consent Decree List tracking purposes only and does not constitute a formal §303(d) or §305(b) submittal, nor is this Category 1 listing a requirement of the Clean Water Act.

The full Category 1 table is contained in Appendix C at: 10 IR1-FINAL-Appendix C-Category 1.

APPENDIX D: Complete list of suspected causes of impairment and cause descriptions used in USEPA's Assessment Database

The full list of suspected causes of impairment is contained in Appendix D at: 10 IR1-FINAL-Appendix D-Causes.

APPENDIX E: Complete list of suspected sources and source descriptions used in USEPA's Assessment Database

The full list of suspected sources of impairment table is contained in Appendix E at: 10 IR1-FINAL-Appendix E-Sources.

APPENDIX F: Complete Listing of Louisiana's Ambient Surface Water Quality Network Sites

The full list of ambient surface water quality network sites is contained in Appendix F at: 10 IR1-FINAL-Appendix F-Monitoring Sites. Not all sites contained in this list are currently sampled as part of LDEQ's rotating monitoring sites program.

APPENDIX G: Public Comments on the 2010 Integrated Report and LDEQ's Response to Comments

Appendix G is a compilation of all comments received regarding the 2010 Integrated Report, along with LDEQ's response to those comments. Any changes made to the 2010 Integrated Report based on public comments are noted in the column entitled, "Summary of LDEQ Responses." Also included in this response are changes made to the 2010 Integrated Report during the review period following public notice.

The full table of public comments and LDEQ's responses is contained in Appendix G at: 10 IR1-FINAL-Appendix G-Response to Comments.

APPENDIX H: Louisiana's 2010 Section 303(d) List

Appendix H represents a subset of Louisiana's 2010 Integrated Report (IR) and includes only those water body impairment combinations (WICs) reported as Categories 5 or 5RC. As has been noted in the body of the IR text, WICs in Categories 5 and 5RC of the IR assessments are the only WICs on Louisiana's 2010 §303(d) List. This table was developed only as an aid to the public and does not constitute Louisiana's "official" §303(d) List. Every effort was made to maintain consistency between Appendix A Categories 5 and 5RC WICs and Appendix H. ***However, in order to ensure the accuracy of the overall Integrated Report, only those WICs in Appendix A, Categories 5 and 5RC, constitute the "official" §303(d) List.***

The full table of §303(d) Listed WICs, with the caveat noted above, is contained in Appendix H at: 10 IR1-FINAL-Appendix H-Cat 5 303d List.